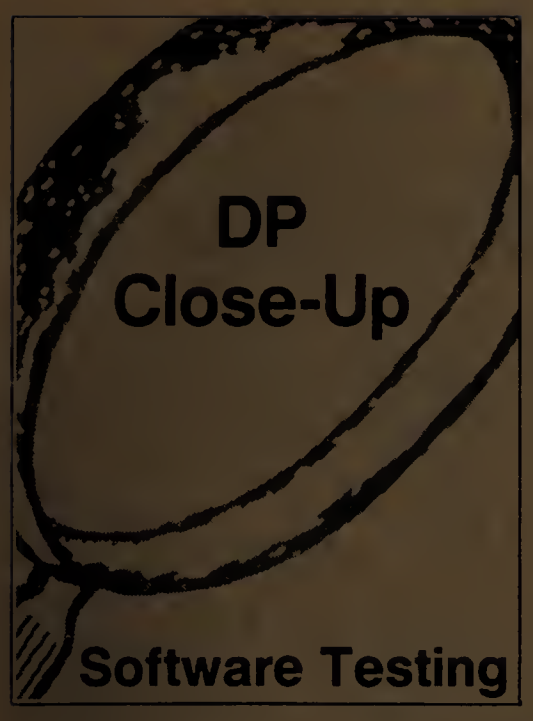

Why Are Users Getting Untested Programs?

By Paul Gillin
CW Staff

You wouldn't set out in a sailboat without first making sure it floats. So why do so many DP departments release programs to users without testing their performance in an intensive business environment?

In interviews with *Computerworld* last month, consultants and analysts agreed that software testing and debugging still rank disappointingly low on most DP shops' list of priorities. In the face of large application backlogs and frequent program fire fighting, "testing is still one of those things that seems to get cut out too frequently in an attempt to meet a delivery deadline," said William Duncan, president of Duncan Associates in Beverly, Mass.

As bugs begin to turn up in production programs, consultants said, a classic snowball effect often develops. Programmers are hastily pulled off important projects to fix defects in existing software. Development projects consequently fall behind schedule, leading departments to trim testing in order to meet deadlines. The result is more bugs, more fire fighting and more neglect of testing procedures.

"Any rational manager should believe we're talking an average of 50% [of the project time] for testing and debugging," said Boris Beizer, a consultant and author of the book *Software Testing Techniques*. "They take half of the software effort and apply absolutely no methodology to it. They talk about structured programming, data dictionaries, but when it comes to where the real bucks are spent, every programmer does his own thing."

Letting programmers do their own thing is one of the major problems, according to consultants. For a variety of reasons, programmers of-

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

NEWSPAPER

Weekly Newspaper

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FCC Decides To Reduce Access Charge

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Local exchange network users will pay about $3.5 billion more for service next year — instead of $4.8 billion more — under a decision adopted by the Federal Communications Commission last week.

The new ruling replaced an access charge decision the commission promulgated last December which would have increased subscribers' direct charges by about $4.8 billion next year. The December decision was widely criticized in Congress and by U.S. Federal District Court Judge Harold Greene, who is presiding over the settlement of the U.S. vs. AT&T antitrust case.

Greene and the congressional critics felt the December ruling jeopar-

(Continued on Page 8)

NCR Again Found Guilty Of Breach of Contract

By Bill Laberis
CW Staff

SAN FRANCISCO — For the second time in a year, NCR Corp. has been found guilty of breach of contract, this time by a court-appointed arbitrator, and ordered to pay damages to a minicomputer user.

In reaching his decision, Karl A. Limbach of the American Arbitration Association set aside a charge of fraud lodged by Peerless Electric Co. of Berkeley, Calif., thereby drastically reducing the $3.4 million damage claim sought by the company's attorney, Richard Perez. The final settlement decision was scheduled to be reached late last week, in time for a July 30 deadline.

Limbach ruled, in essence, that although NCR breached its contract with Peerless, it did not do so willfully. Rather, the arbiter found that NCR's decision to cancel development of a particular software capability was done without knowing that the same capability had been promised to Peerless by NCR's regional sales staff.

The arbiter's decision, handed down June 30, ordered NCR to return $160,000 to Peerless in exchange for an I-9040 minicomputer purchased from NCR in 1981. NCR was also ordered to pay Peerless a total of $56,000 in legal fees and damages suffered as a result of the contract breach.

Alternatively, Peerless was given the option of retaining the equipment, in which case NCR would be ordered to pay nearly

(Continued on Page 8)

M&D Offers Integrated Applications For IBM Sites

By Lois Paul
CW Staff

NEEDHAM HEIGHTS, Mass. — McCormack & Dodge Corp. last week introduced a group of on-line, real-time financial applications packages based on its Advanced Financial Systems design methodology.

Called the Millennium series, the packages share a common environment which includes a data base management system; a fourth-generation programming language; a screen and forms generator; and Hi-lite, the vendor's on-line query system. The Millennium series, which runs on IBM and plug-compatible mainframes operating under OS and DOS, is intended to replace McCormack & Dodge's current on-line packages.

Millennium reportedly is an integrated series of products that incorporates uniform structure and consistent features across all applications. The first products in the series, which will be available in the fourth quarter, are fixed assets (FA:-Millennium); general ledger (GL:Millennium); accounts payable (AP:Millennium); and purchase order (PO:Millennium).

Scheduled for release in the first quarter of 1984 are human resources (HR:Millennium) and capital project analysis (CPA:Millennium).

Applications within Millennium will share common system functions, such as data entry, update and query.

(Continued on Page 9)

Congress Poised to Repeal Withholding

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. House of Representatives and Senate late last week agreed on a final version of a bill to repeal the controversial interest and dividend withholding law set to go into effect Aug. 5. Final passage and presidential approval are expected by the end of this week.

The often-delayed law would have required corporations and financial institutions to withhold 10% of interest and dividend payments and had been expected to raise an additional $13.4 billion in five years for the U.S. Department of the Treasury. It was slated for implementation July 1, but was delayed until Aug. 1 and then, last week, to Aug. 5 in anticipation of the repeal legislation.

At press time, neither the House nor the Senate had voted on the compromise worked out last Wednesday, but the large majority support for the repeal measure in both houses made passage all but assured.

While President Reagan had earlier threatened to veto repeal legislation, he was expected to sign this bill because it contained several additional provisions. Chief among those provisions are increased enforcement of existing withholding statutes and greater penalties for violators. Congressional estimates placed the increased income from these measures at more than $4 billion.

The bill also includes the president's aid bill for Caribbean nations.

The withholding law was a key part of the 1982 Tax Equity and Fiscal Responsibility Act. But the measure, which would have cost some large organizations millions of dollars to reprogram their record keeping systems, was attacked by the banking industry, which mounted a huge and successful lobbying campaign against it.

Next Week: CW's Annual Hardware Roundup

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Marketing Effort Also Announced

Tandem Adds Basic to Repertoire

By Jeffry Beeler
CW West Coast Bureau

CUPERTINO, Calif. — Tandem Computers, Inc. today added Basic to the four programming languages supported by the company's Non-Stop systems and initiated a marketing effort aimed at encouraging third-party software vendors to develop applications for its processors.

Tandem's Extended Basic is said to be a superset of Ansi X3.6 Basic, which the vendor has reportedly modified to support its standard software offerings, including the Encompass relational data base management system and Transaction Monitoring Facility.

With an additional language now available with the Non-Stop systems, users of rival processors for the first time can transport their Basic applications to Tandem's hardware without reprogramming, Tandem said. Extended Basic thus creates an upgrade path for non-Tandem users who have exhausted or are nearing the limits of their systems' capacity, a spokesman said.

For Tandem's own customers, the availability of Extended Basic is expected to expand greatly the number of users who can take advantage of the firm's systems. The reason for the projected increase in use is that Basic is better suited for nontechnical personnel than the other, more structured languages that have traditionally been available with Non-Stop processors, the spokesman explained. Those other languages include Cobol, Fortran, Mumps and TAL, an Algol derivative.

The modified language is also likely to appeal to independent software providers that write applications in flavors of Basic other than Tandem's own.

In its interpretive version, Extended Basic is available immediately for $2,500 per processor. A compiler extension is slated for release during next year's first quarter.

'Tandem Alliance' Plan

The addition of Extended Basic to Tandem's line of software development tools coincided with the announcement of the "Tandem Alliance" plan, which will aid third-party application program suppliers in marketing their products. Under the plan, Tandem intends to package its own hardware with other vendors' application software and then sell the resulting systems through its worldwide marketing organization directly to end users.

Every time it installs such a system, the processor manufacturer will provide the cooperating application developer with a share of the revenues, the spokesman said.

Terms of the Tandem Alliance also call for independent suppliers of Tandem-compatible applications to receive:

- Unspecified discounts for their Non-Stop development systems.
- Twenty-five weeks of free technical training.
- Application design support.
- A reference catalog describing all user programs capable of operating with Tandem's equipment.

More information is available from Tandem at 19333 Vallco Pkwy., Cupertino, Calif. 95014.

Former IBMer Found Guilty Of Murder in Shooting Spree

DURHAM, N.C. — A former IBM employee was recently found guilty of murdering another employee during an armed rampage through a company plant last year. The jury that rejected his insanity defense also later denied his plea for the death penalty and sentenced him to life imprisonment.

Leonard D. Avery, 39, of Raleigh, N.C., was found guilty July 22 of the first-degree murder of 53-year-old Ralph Glenn last Aug. 30 during the rampage in which four other employees were injured at IBM's manufacturing facility in Research Triangle Park, N.C.

Avery was found guilty of 13 additional charges and was to be sentenced on those charges later in the week.

Stress Cited in Defense

Employed at IBM for almost 12 years before his dismissal as a keyboard assembler less than two weeks before the incident, Avery claimed in his defense that post-traumatic stress from his Army service in Vietnam had driven him insane. He served in Vietnam during 1966 and 1967 and for four months in 1968.

After the jury rejected that argument and found him guilty, one of Avery's lawyers told the jurors during the sentencing hearing that the defendant desired to be sent to the gas chamber rather than prison; the jury decided on prison.

Durham County District Attorney Ronald Stephens said Avery "was a disgruntled IBM employee who threatened to come back and seek revenge on IBM if he was fired."

Avery had been receiving treatment for Vietnam-related stress prior to the shooting, according to Stephens. He had been on a paid leave for that treatment for about one month before IBM fired him after learning that medical personnel had not authorized an absence.

Avery was armed with three weapons and walked into Manufacturing Building 201 intending, Stephens said, "to burn up the IBM plant and to shoot it up." Stephens said Avery was not acquainted with Glenn, who had been employed by IBM since 1973.

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APPLIED DATA RESEARCH

The new vendor system software solution

CW at Siggraph '83

Few New Products Introduced at Show

By Ed Scannell
CW Staff

DETROIT — While visitors to the Association for Computing Machinery's Special Interest Group on Computer Graphics (Siggraph '83) exhibit floor were treated to a kaleidoscopic display of computer-generated colors, fewer system and workstation announcements were made than at last year's show.

Most of the systems and workstations demonstrated last week had already been introduced either at the National Computer Conference in May or at the mammoth National Computer Graphics Association show in Chicago just four weeks ago. However, there were some unveilings of note, including two 16-bit micro-based systems, a fistful of color display terminals and what is reportedly the industry's first electrostatic color plotter.

Three Rivers Computer Corp. complemented its Perq 1 and 2 graphics workstations with the Perq Color system, which offers a 19-in. monitor displaying up to 256 colors and a memory consisting of eight planes, each with 1,024 by 1,024 bits. Intended for both business and computer-aided engineering applications, the system's bit-sliced hardware can carry out functions such as pan, zoom and fill. Available software includes Three Rivers' optional Perq Color Graphics, a collection of Fortran subroutines.

A typical configuration costs $21,900. Three Rivers is based at 720 Gross St., Pittsburgh, Pa. 15224.

Entry-Level CAD Systems

Manufacturing and Consulting Services, Inc. introduced two entry-level computer-aided design (CAD) systems. One is a single-user machine built around Data General Corp.'s recently released Desktop Generation processor, and the other is a multiuser system based on Digital Equipment Corp.'s VAX-11/730 superminicomputer.

Described as a "personal desktop CAD system," the single-user Anvil-3000D sports a floppy disk drive, a 15M-byte hard disk drive, Tektronix, Inc.'s 4107 color display and color plotter and the Anvil Workplane tablet. The multiuser version of the system supports up to four users and features a floating-point accelerator, 50M-byte hard disk, magnetic tape subsystem, four Tektronix 4107 color displays and color plotter and the Workplane tablet.

The price of the single-user model is $38,500, while the multiuser version costs $98,500. Manufacturing and Consulting Services is based at 17942 Cowan, Irvine, Calif. 92714.

Intecolor Corp. plunged into the high-resolution market for the first time with a color graphics terminal that displays eight colors simultaneously on a 19-in., bit-mapped display. The Tektronix 4014-compatible device supports a full complement of graphics demands, including point, line, polyline, rectangle, circle, zoom and pan. Four sizes of Tektronix character sets are included in the standard configuration along with two graphics character sets.

Purchased in 100-piece quantities, the terminal lists for $3,995. Intecolor is based at Intecolor Drive, 225 Technology Park, Norcross, Ga. 30092.

Versatec's electrostatic color plotter produces the full color spectrum, via translucent toners, onto standard 42-in.-wide roll paper. The unit generates color E-size drawings in eight minutes and black-and-white drawings in under 90 seconds, according to the vendor.

Aimed at applications involving CAD and geophysics, the plotter uses Versatec's standard interfaces to plot in monochrome. Color plotting requires modifications to software, the company noted.

The unit is expected to cost $98,000. Versatec, a Xerox Corp. subsidiary, is located at 2710 Walsh Ave., Santa Clara, Calif. 95051.

Vendors Show Standards Bias With Software

By Ed Scannell
CW Staff

DETROIT — Several major players used new software products to demonstrate a further commitment to their favored graphics standards at the Association for Computing Machinery's Special Interest Group on Graphics (Siggraph '83), the conference held here last week.

Tektronix, Inc.'s Information Display Division unwrapped a version of its Plot 10 library of graphics software tools that is compatible with the GKS standard. The company said it will continue to support other Plot 10 development tools, including Plot 10 IGL, which adheres to the Core standard.

Plot 10 GKS supports two-dimensional graphics functions, color panel filling, graphics segments capabilities, graphics and nongraphics input and the fundamental workstation concepts employed by GKS. The basic package licenses for $7,500, with a more typical configuration, which includes Fortran 77 source code, costing $8,070.

Tektronix can be reached through P.O. Box 500, Beaverton, Ore. 97077.

Precision Visuals, Inc. introduced a device-independent device driver that makes its DI-300 and Grafmaker packages compatible with the North American Presentation-Level Protocol Syntax (NAPLPS) videotex standard. NAPLPS, which encodes text and graphics in a terminal-independent format, has been endorsed by AT&T; Digital Equipment Corp.; Tektronix; Honeywell, Inc.; and Digital Research, Inc. among others, a Precision spokesman pointed out.

Precision Visuals is headquartered at 6260 Lookout Road, Boulder, Colo. 80301.

Among those at Siggraph '83 trying to cash in on the success of IBM's Personal Computer included Advanced Color Technology and Aztek, Inc.

Advanced Color Technology unveiled two software driver products, one of which will connect the company's color ink jet printers to the Personal Computer. The second will link the printers to Zenith Corp.'s Z-100 microcomputer.

The driver, dubbed the ACT-COM, was designed to reformat colored screen data and output it to either the ACT 1 or the ACT 11 Chromajet printer.

Advanced Color Technology is located at 21 Alpha Road, Chelmsford, Mass. 01824.

Aztek announced PCchart, a business/presentation package that enables users to output to a variety of Personal Computer-compatible printers and plotters as well as Aztek's Slidesystem.

Cost of the slide-making product, which requires a Personal Computer with 256K bytes of memory, dual disk drives, color monitor with adapter board, asynchronous IBM communications adapter, modem and pen plotter, is $995. Aztek is located at 23265 S. Pointe Drive, Laguna Hills, Calif. 92653.

Microcomputers Make Move From Wings to Center Stage

DETROIT — If the 10th annual show mounted here last week by the Association for Computing Machinery's Special Interest Group on Computer Graphics (Siggraph '83) is any barometer, microcomputers have stepped from the wings to center stage of the computer graphics arena.

A walk through Detroit's Cobo Hall on any one of the three days the exhibition floor was open would have gladdened the heart of any executive from Motorola, Inc., Intel Corp., or Zilog, Inc. It seemed most of the 183 exhibitors had at least one 68000-, 8086-, or Z8000-based system or workstation set up in their booths.

The usual war of words was waged between minicomputer and microcomputer manufacturers, with microcomputer advocates predicting mini-based systems' final curtain and with mini believers pointing out that micros still can't match minis' price/performance in many business and computer-aided design and manufacturing applications.

"People are going micro because they don't want to be tied into an outdated minicomputer architecture.

"They want [very large-scale integration-based] systems," asserted Ed Zander, Apollo Computer, Inc.'s director of corporate marketing.

Micro Popularity

Zander said the popularity of micro-based systems over the past year can be traced to the inexpensive integration of 64K-byte random-access memory (RAM) chips, bit-mapped graphics, more sophisticated local-area networks, multiwindowing technology and improved Winchester disks.

The approach of many minicomputer-based companies, such as Digital Equipment Corp., that attach a number of graphics terminals to a VAX-11/780-caliber system results in severe degradation of system performance, Zander said. This approach, he contends, will be replaced by one that is anchored by more powerful distributed 32-bit systems that can access distributed data bases and will not require today's huge but overloaded centralized mainframes.

Zander said DEC's efforts to put the VAX-11 on a chip is the right way to fend off the micro challenge. However, he claimed that 68000-based workstations, like the ones made by his firm and others, have beaten DEC to the punch.

Mini-Mainframe Hybrids?

Vinod Khosla, chief executive officer of Sun Microsystems, Inc., a competitor of Apollo, went as far as to say minicomputers will soon disappear altogether but will eventually come back as a hybrid using a combination of minicomputer and mainframe architectures.

Tom DeFanti, director of the Chicago-based Electronic Visualization Laboratory and chairman of this year's Siggraph conference, thinks "minis aren't dead, but maybe time-sharing is. Minis can still fight back by offering chip sets."

DeFanti said with technology blurring the technological boundaries, it may be a moot point to discuss the various advantages and disadvantages between minicomputers and microcomputers. "What is the difference between 32-bit micros and minis? One needs a cooling system and an operator and the other doesn't," DeFanti offered.

The balanced view was taken by Tom Wright, director of development for Integrated Software Systems Corp., who acknowledged that the path being taken by Apollo and others makes sense, but admitted these powerful distributed 32-bit systems will still need the number-crunching capabilities of the centralized mainframe.

"Fortune 500-type companies want micros to be a part of the corporate plan, but they don't want people seceding from the computing center. Things like the Apollo system is the right way to go, but they will not force the computing center to cease to exist."

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Money Not the Reason

Top DP Execs Tell Why They Took the Job

By Tom Henkel
CW Staff

It's the job — not the promise of more money, better benefits or tantalizing perks — that convinces top-level DP executives to change jobs.

Four out of five DP executives who were recently promoted to the top decision-making slot in DP operations were not looking for a new job when opportunity knocked, they recently told *Computerworld*. Two of them heard about their current positions when they received telephone calls from professional recruiters; two others were in the right place at the right time. The fifth, an executive for a vendor firm plagued by managerial and financial troubles, heard of his current job as manager of a DP shop from a friend.

One of the two executives who received a call from a headhunter was John P. Sullivan. He had just received a promotion to computer operations manager at Mutual Benefit Life Insurance Co. in Newark, N.J., along with the opportunity to write his own job description. "I was very happy where I was," Sullivan recalled.

Calls from headhunters trying to find jobs for their clients are commonplace at Mutual Benefit, and Sullivan generally refused their calls. He is not sure why he took the recruiter's call that particular day.

The recruiter painted a rosy picture of a position that offered divisional responsibility for DP operations in a food distribution firm. Sullivan decided to go for an interview and was subsequently offered a job as manager of DP operations for the Information Services Division of Wakefern Food Corp. in Elizabeth, N.J.

'Offer I Couldn't Refuse'

"They made me an offer I couldn't refuse," Sullivan said, noting his current position offers him more responsibility and broader opportunities than his old job. In addition, his new position offers the challenge of leading his department through a conversion from IBM's DOS to MVS operating system, as well as a relocation of the firm's data center.

Garwood E. Erickson, an office systems manager for Ford Motor Co.'s Parts and Service Division in Dearborn, Mich., was not unlike Sullivan. Generally happy with his job of 14 years, Erickson found his position interesting and challenging. Furthermore, he felt he had established a solid growth path within Ford.

Erickson received an unsolicited call from a recruiter telling of an opening with a contract engineering firm in Ann Arbor, Mich. Erickson resisted the recruiter, insisting he did not want to make a move. But the recruiter was persistent, and the job sounded interesting. Erickson finally consented to go on an interview.

The job was director of MIS with Hoover Universal, Inc., a much smaller firm than Ford. However, Erickson was offered control of the firm's DP operation. It was an opportunity to make his own decisions and have a say in company policy. The position also offered promotion to a level that could take years to achieve at Ford.

Erickson accepted the position at Hoover Universal, but the decision to leave Ford was not an easy one to make. Erickson had already made a long-term commitment to Ford and felt he was on his way to becoming a top executive. But it was "a long, slow path."

Hoover Universal "didn't buy me away," Erickson insisted, adding that money is only a short-term enticement because "you quickly adjust to a higher level of income." It was the scope and challenge of the job that lured Erickson away from Ford. The chance to speed up his career growth by several years and have a personal impact on his company's direction were also big selling points.

In a way, John Highbarger's former employer set him up in his new job as director of MIS at Dallas-based Diamond Shamrock Corp. Highbarger was a senior manager in the management advisory group with Price Waterhouse and Co. — in short, a consultant — and had been assigned to Diamond Shamrock for four of his five years with Price Waterhouse.

During those four years, Highbarger had the opportunity to evaluate Diamond Shamrock — its policies, its management, its style. He liked what he saw.

Classifying himself as "unspiritable" by lures of headhunters, Highbarger said he "debated long and hard" before accepting his current job. Like Sullivan and Erickson, he was happy with his former job.

Today, after serving three months as director of MIS at Diamond Shamrock, Highbarger says the move was worth it. "It's an excellent company, and they made me an excellent offer."

Circumstances also played a big role in Michael N. Thompson's career. Three years ago, Thompson uprooted his family and moved from Philadelphia to Manchester, N.H., to become director of applications development with the Domestic Brokerage Division of American International Group, Inc. In those three years, Thompson acquainted himself with top executives in other divisions of the company. He knew there were problems in the firm's New Hampshire Insurance Group. And he had heard rumblings of dissatisfaction with the division's vice-president of MIS. When that executive was "out-placed," as Thompson euphemistically put it, he was ready to make his move. Thompson successfully lobbied for the job of MIS vice-president.

In many ways, the change was easy for Thompson. He simply moved to a new office in the same building. He already knew most of his new colleagues, and he was familiar with the company and its policies.

Honeymoon Didn't Last

But adapting to the new job has not been any easier for Thompson than for executives who change companies. "I had hoped the honeymoon would have lasted longer," said Thompson, now a seven-month veteran of his new job. The DP department at the New Hampshire Insurance Group was in a state of disarray, and Thompson finds himself trying to straighten out procedures and policies in the DP department while at the same time integrating micros into the DP operation — something his predecessor had resisted.

Jay Roth was ready to scrap his career as an "ironmonger." After working for hardware vendors, he wanted an end-user job.

Roth had been working for six months as a software support specialist with a Roseville, Minn., micro-

When the vice-president of MIS in one of his company's other divisions was "out-placed," Michael N. Thompson lobbied for the job.

computer firm, and "it did not work out." The firm was in trouble. There had been several top-level management reorganizations. Roth felt the firm was ready to go down for the third time. (In fact, not long after he left, the company started making heavy layoffs.)

Through a friend, Roth heard the job of DP manager was open at ITT Industrial Credit Co.'s Automated Finance and Lease Division in St. Paul, Minn. Roth expressed interest in the position and was hired.

So far, Roth likes his new career. He admits the end-user, service-oriented side of DP is certainly different than working for a computer vendor, but says it has been a challenge, and the work has remained interesting.

Survey Profiles DP Job Hunters

AKRON, Ohio — The job is boring. The managers lack leadership. The managers lack sensitivity.

Sound familiar? These are the main reasons at least 3,000 high-tech professionals are currently in the job market, according to a recruitment firm here that polled 3,059 job seekers in late 1982 and early 1983.

Nearly 90% of the job hunters surveyed by Sanford Rose Associates, Inc. were 25 to 35 years of age and had incomes ranging from $25,000 to $40,000. Only 27% of those polled said money was their primary motivation for seeking a new job.

"The survey dramatically indicates that companies [that] must count on the brain power of key professionals and want to attract and retain quality people, must make a successful effort to keep jobs gratifying and meaningful to the employee," according to Sanford Rose, chief executive officer of the recruitment firm. "No longer can income advances alone be counted on to assure the allegiance of the modern generation of workers."

A whopping 80% of those polled said their employers had failed to define adequately their job responsibilities and authority. Further, 75% said they had lost faith in their employer's leadership and general management abilities.

More than 2,000 of the job seekers said their current jobs were boring. Sixty-six percent said their jobs were neither creative nor challenging. And 58% said they were sick of performing routine work.

Fifty-eight percent also complained that their jobs failed to offer them the freedom to exercise initiative in their work.

Slightly more than half of those polled (53%) said their employer failed to recognize their abilities. A higher percentage — 65% — said their employer failed to make adequate use of their education and experience.

Courses Cover Project Skills

NAPERVILLE, Ill. — Deltak, Inc. has released the final three courses of a microcomputer-based training series designed to instruct experienced system developers in DP project management skills.

"Cost Estimating and Funding" covers project cost estimating and project selection and funding. "Organizing the Project" covers implementing plans, administering ongoing activities and setting up control systems. "Controlling the Project" covers internal control and change control, which the project manager is expected to exercise.

The eight-course Project Management Series (No. 27-7XX-ME) is for project leaders and those whose responsibilities include planning, supervision or coordination, a spokeswoman said.

The courses require an Apple Computer, Inc. Apple II+ computer with 48K bytes of memory, two disk drives and an Apple language system.

Each course costs $50 to $125/mo to rent; the courses are available for purchase at $1,750 each. Deltak is located at East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

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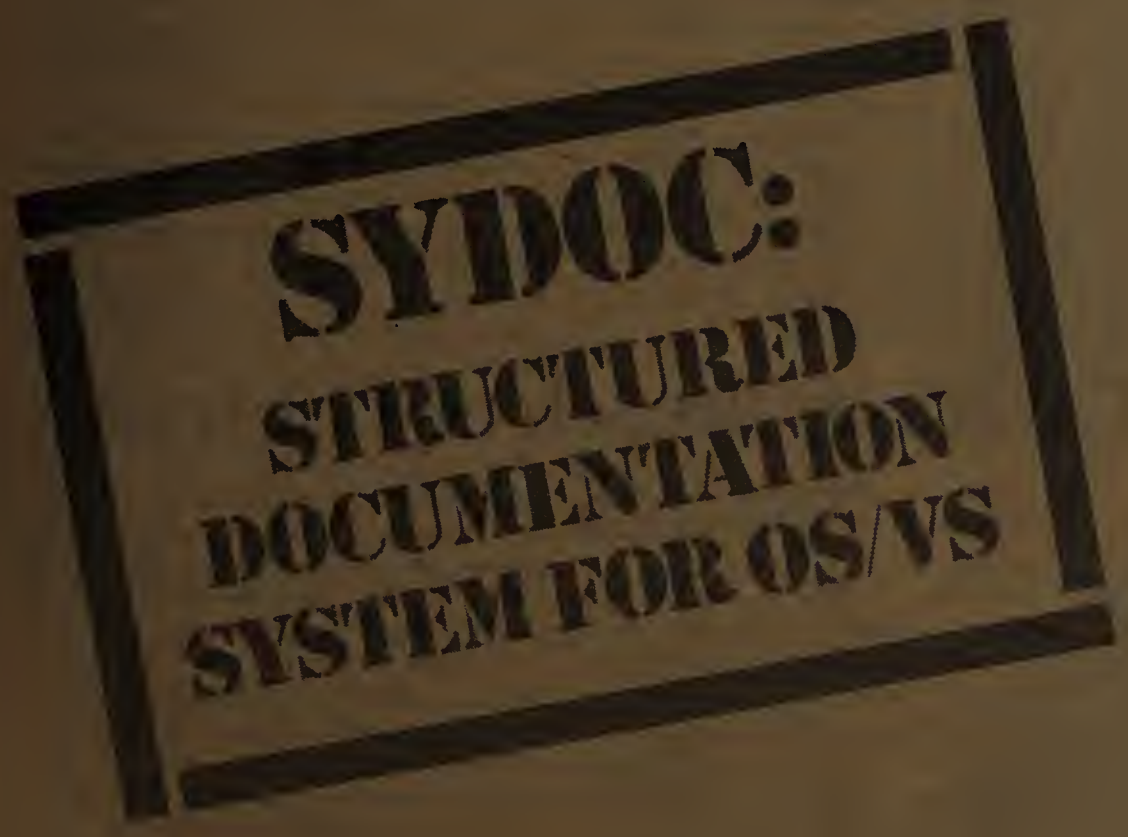

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Issue of Wideband Interfaces Heats Up Again

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Although the Federal Communications Commission (FCC) decided two months ago to let independent manufacturers supply the interfaces linking user terminals to wideband digital access channels, the issue resurfaced last week. Several Bell operating companies asked the commission to reconsider and/or defer its June decision.

Also at the FCC last week, AT&T objected to a related decision. Together, these moves signal the resumption of a bitter, protracted battle between the telephone carriers and competing suppliers over who will control access to the integrated services digital network (ISDN) that AT&T is beginning to deploy across the U.S.

Specifically, the battle is over who should supply channel service units (CSU) and network channel terminating equipment (NCTE), the interfaces that connect a user's digital terminal with such wideband offerings as AT&T's Dataphone Digital Service (DDS), Terrestrial Digital Circuits (TDC) Service and High Speed Switched Digital Service (HSSDS).

These services are expected to be part of the AT&T ISDN when it finally emerges.

The battle concerns users as well as suppliers. Until it is resolved, users will have to wait to exploit fully the emerging smart network services based on ISDN technology. The reason: The CSU/NCTE is the user interface to the ISDN.

International as well as domestic communications users have a stake in the battle. The interface ultimately adopted in the U.S. will have to work with the one now being developed by the Consultative Committee on International Telephone and Telegraph (CCITT). And according to the petition filed last week by the Bell operating companies, the CCITT's approach "directly conflicts" with the FCC's.

The petitioners — which include the Bell operating companies comprising the New York/New England, Pacific, Southeast, Southwest and Mid-Atlantic regions, as well as Cincinnati Bell and Mountain Bell — asked the FCC to reconsider its June ruling that there is "no technical, legal or policy justification for restricting independent manufacturers from providing CSUs or digital NCTE to digital service subscribers." The operating companies contend there are both legal and technical reasons for making the carriers the device's exclusive suppliers.

One of those reasons, according to the operating companies' petition, is that the reorganization plan implementing the U.S. vs. AT&T antitrust settlement assigns NCTE to the operating companies and customer premises equipment — that is, terminals — to AT&T. "Consequently, the treatment of NCTE under the [antitrust settlement agreement] and that prescribed by the commission . . . are at odds," the petition said.

As long as NCTE is provided by the carrier, the Bell operating companies "can optimize [their] local networks by use of the latest and most efficient technology without rendering the customer's equipment obsolete." The petition contended that interfaces to older NCTEs can be maintained while the newer devices are gradually introduced.

The operating companies also argue that technical differences in wideband access circuits make it necessary to adjust NCTEs and CSUs to meet individual requirements. Their petition points to a provision of the FCC's June decision that enables a carrier to become the exclusive NCTE supplier "in specific circumstances" if it can show that the differences are substantial and subject to constant change.

"The commission presumes that these [unstable characteristics] are the exception rather than the rule," the operating companies said.

AT&T's Action

AT&T referred to this same section of the FCC's June decision when it filed a statement last week objecting to a related decision. The related decision was issued last January, when the commission ordered AT&T to remove restrictions limiting the use of its group and super group channels. The decision was made in response to complaints from specialized carriers.

The group and super group channels are long-distance analog rather than digital facilities. A group channel is 48kHz wide and accommodates up to 12 analog voice circuits or data transmission at speeds up to 56K bit/sec. A super group channel is 240kHz-wide and accommodates up to 60 analog voice channels or data transmission at 230K bit/sec.

AT&T required those who use the group and super group channels to employ a modem supplied exclusively by AT&T. In January, the FCC asked the carrier to justify this requirement.

In last week's filing, AT&T stressed the technical variability of the local loops connecting users to group and super group channels. "There is simply no way to provide a generally applicable set of specifications for all criteria of group and super group NCTE that could be followed to build a single piece of equipment which, when attached to any local distribution facility, will provide an acceptable group or super group signal," AT&T said.

AT&T's Tariff No. 260, in effect for years, was recently changed so private users as well as specialized carriers can lease group and super group channels. But the modems at the ends of these facilities still have to be supplied by AT&T.

In its June decision, the FCC told AT&T to propose interim specifications enabling independent manufacturers to build CSUs and NCTEs that could be attached directly to digital access channels supplied by the phone company.

Charge for Local Exchange Access Cut

(Continued from Page 1)

dized universal telephone service since it imposed a surcharge on all local exchange users.

Last week's revised access charge ruling retains but reduces the surcharge.

Business line subscribers will pay a maximum monthly surcharge of $6/line beginning in January. This charge will continue until the end of 1986. The original plan called for a minimum monthly charge of $4/line, but additional monthly charges of up to $40/line were possible.

The surcharge levied on business users is one of four revenue sources designed to reimburse local telephone companies for the costs they incur in providing access to long-distance transmission facilities. The other sources are:

- A maximum monthly levy of $2 to $4/line imposed on residential subscribers.
- A $25/mo charge for the "closed end" of every private line that can provide a bypass around long-distance telephone network facilities. One example of such a bypass would be private branch exchanges (PBX) in two or more cities connected to each other as well as to the adjacent local telephone networks by private lines.
- An access charge imposed on long-distance carriers. Levied until the end of 1986, this charge will make up any difference between what the local carriers need to cover their costs of providing interstate access and what they collect from the other three revenue sources. In the following three years — 1987 to 1989 — this "residual amount" will be shifted to subscribers at a rate of 25% annually, forcing their rates up accordingly.

In 1984, the commission said, local telephone carriers will have to collect about $10.7 billion from users of interstate services to cover the local carriers' costs of providing access, plus the subsidy that interstate subscribers have historically contributed to local telephone service. The FCC said that the charges to be levied directly on residential and business users are expected to supply about $4.5 billion, leaving $6.2 billion to be collected from long-distance carriers in the form of access charges. The bulk of this latter amount will come from AT&T's Long Lines Division.

Many users of Centrex-Central Office equipment were unhappy with the FCC's December access charge decision because it levied a flat charge on each line between the user's premises and the telephone company's central office. As a result, Centrex-Central Office users would have paid far more than users of PBX equipment.

In the new decision, this same basic charging scheme has been retained, but instead of paying the business line charge — $6/line per month during the years 1984 to 1988 — Centrex-Central Office users will pay the residential rate: $2/line in '84, $3/line in '85 and $4/line in '86.

The commission said it was offering this discount only to those with Centrex-Central Office lines on order or in place as of July 27, 1983. It wants to give these subscribers "an opportunity to compare the advantages of Centrex-[Central Office] . . . against the advantages of PBX and to act on that assessment."

NCR Found Guilty of Breach of Contract

(Continued from Page 1)

$20,000 in equipment and expenses incurred by Peerless to gain the computing capabilities it claimed NCR promised but did not provide, as well as $31,000 in legal fees. At press time, Peerless had not decided which option to exercise and was believed to be still negotiating with NCR.

Last September, a U.S. appeals court upheld a lower court's decision ordering NCR to pay $2.3 million to The Glovatorium, an Oakland, Calif., dry cleaner that purchased a minicomputer which, the courts found, NCR knew would not work as promised [CW, Sept. 20]. Perez also litigated that case for the user.

The same member of NCR's sales staff, Thomas Warman, was implicated in both the Peerless and Glovatorium cases, according to testimony delivered before the arbitrator.

Efforts to reach NCR's attorneys for comment before press time were unsuccessful.

Peerless' original complaint was filed in California Superior Court last December. Owing to a so-called "universal clause" in NCR's contract with Peerless, a clause common in most vendor-user contracts, the case was bound over to an arbitrator when it could not be proved that NCR had fraudulently coerced Peerless into signing the contract.

The complaint stated that Warman and others from NCR's regional sales office here worked with Peerless to design a system based around NCR's I-9040 minicomputer. One of Peerless' requirements was that the system have the capability of supporting Fortran and producing color graphics, capabilities NCR was developing for the 9040 and Peerless claimed it was promised.

Peerless claimed further that NCR promised the system would have word processing capabilities which would share a data base with accounting and manufacturing applications while supporting multiple terminals without significant degradation.

However, the complaint continued, substantial degradation occurred when multiple terminals were used, and the Fortran graphics capabilities were never delivered, mainly because NCR ceased development.

Perez, Peerless' attorney, was unable to prove Warman defrauded Peerless, despite efforts during the arbitration hearing to link Warman to a pattern of fraudulent behavior going back to his involvement in the Glovatorium case.

M&D Unwraps On-Line Series Of Packages

(Continued from Page 1)

This consistent structure is intended to facilitate integration of applications, as well as to provide the ability to query across application data bases regardless of system borders. The vendor noted that this feature allows the user to follow an audit trail of information through the integrated Millennium systems.

A screen-linking feature reportedly allows the user to save screens and return to them and to transfer information automatically from screen to screen. In addition, a security system, called Secure, is incorporated in all Millennium systems. It provides user-defined security at the applications, function, screen, field and query levels.

On-line, real-time design and update of screens also are available with the Screenpaint feature which, the vendor said, eliminates the need for coding and batch runs. On-line Help documentation is provided with the Millennium series in both system-defined and user-defined formats.

The Interactive PC Link, which will be available in October, is an option with all Millennium applications. Interactive PC Link was designed to allow users to download selected records and fields from mainframe files to an IBM Personal Computer and, following manipulation with Lotus Development Corp.'s Lotus 1-2-3 software, upload the updated information back to the mainframe.

Current users of McCormack & Dodge applications packages who are under the maintenance agreement will be upgraded to the Millennium series at no additional charge. All users of the firm's software must convert to the new on-line system within a year.

For new users, the approximate pricing for the Millennium series, which is dependent upon configuration and options selected, is: GL:Millennium, $50,000 to $90,000; AP:Millennium, $31,000 to $55,000; PO:Millennium, $30,000 to $50,000; HR:Millennium, $80,000 to $115,000; FA:Millennium, $38,000 to $55,000; and CPA:Millennium, $15,000 to $24,000.

McCormack & Dodge is based at 560 Hillside Ave., Needham Heights, Mass. 02149.

'Integrated Systems' Topic of Briefing

SAN FRANCISCO — Techtran, a subsidiary of the Gartner Group, will present a technical briefing on "Integrated Information Systems" here Sept. 15-16 for data processing, office automation and communications managers and professionals.

Techtran said that pioneering experiences, commercially available products, the future shape of the industry and the role of IBM will be discussed.

The fee for the session is $595. More information is available from Bob McKane at Techtran, 72 Cummings Point Road, Stamford, Conn. 06904.

M&D Not Becoming Data Base Company

By Lois Paul
CW Staff

NEEDHAM HEIGHTS, Mass. — Despite the fact that its Millennium series of applications software incorporates data management capabilities, McCormack & Dodge Corp. is not planning to become a data base company.

"In fact, I think the data base companies are becoming application systems companies," according to John B. Landry, senior vice-president of research and development for the firm.

"People want applications," Landry said in a recent interview. "They are not necessarily interested in buying a data base management system."

Millennium eventually will be sold as a development environment, Landry said, although at this point its fourth-generation language cannot be used to build new systems. Currently, Millennium is functioning as an environment under which preprogrammed applications are being executed, Landry explained.

Total Code Delivery

When a user buys fixed assets (FA:Millennium), for example, he receives all of the assembler and Cobol code that will ever be used in any Millennium application.

If the same user then wants to add general ledger (GL:Millennium), he essentially is buying more data in the form of screens, data dictionary elements and fourth-generation language code.

"So what they are getting for their money is the implementation of general ledger using Millennium, but they don't get any more code," Landry explained.

The biggest change in the software is the introduction of additional on-line capabilities to all of the systems for access to and maintenance of data. In the case of the FA:Millennium package, this is the first on-line version of McCormack & Dodge's fixed assets system.

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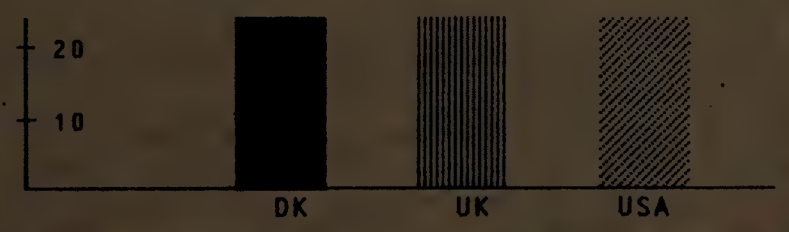

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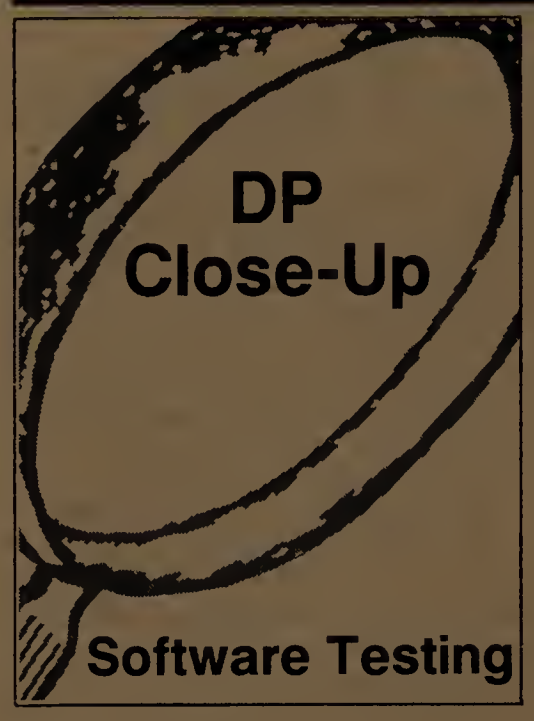


Users Admit They're Cutting Corners

By Paul Gillin
CW Staff

The software testing methods used at DP sites contacted recently by *Computerworld* are nearly as diverse as the kinds of software being tested. Most managers interviewed in an informal survey acknowledged that they are not entirely satisfied with the thoroughness of their testing, but said certain corners have to be cut in the name of cost-efficiency.

At Home Life Insurance Co. in New York, testing is a "joint venture between the information services center and the user," according to Warren Reynolds, senior vice-president of data processing. The informal groups, which are usually led by a systems person, perform joint development and installation and formulate test parameters.

Quality assurance teams made up of users, a member from a separate quality assurance organization, an internal auditor and a project leader from the development group are used at Florida Power & Light Co. in Miami. The team designs systems tests and formulates test data, according to D.K. Baldwin, vice-president of corporate services.

The process is still not entirely satisfactory. "We still test against production files, but we'd like to test more against test files," he said. Because production files are often in use, "scheduling and integrity of files is a consideration."

Users are generally not brought in until standard module testing has been performed at the Palm Beach Co. in Cincinnati. But for complex applications, "we bring in the user to generate test data," according to Dan Waters, director of management information systems.

While testing procedures have not been a problem, "the problem has been getting the user community to be very involved in testing," Waters said. "The more involved the user is, the better the product."

Asked if he is satisfied with the quality of testing at his installation, a DP manager at a Northeastern clothing manufacturer, who asked not to be identified, replied, "I have to say yes, but then I think of all the times we have to run with [a program] because we don't have time [to test it fully]. The amount of testing to perform is a value judgment," the manager said. "I could be philosophical about it, but the real-world goal is to get the job done."

Most managers said that testing has taken on more importance as their shops have moved from batch to on-line applications. "Systems have become more complex and interrelated," Waters said. "Now as you work on order entry, you can mess up invoicing."

Experts Say Micro Packages Poorly Tested, Bug-Ridden

Your testing headaches are bound to ease as users begin to employ all those nifty micro software packages with the easy-to-read documentation, right?

Don't be so sure, said microcomputer software consultants interviewed recently by *Computerworld*. As a rule, micro packages are more poorly tested than their mainframe counterparts and, in many cases, even more bug-prone than programs written in-house, the consultants said.

In short, the state of micro software testing is "pretty grim," according to Harry Brawley Jr., president of Sigea Systems, Inc., a micro software design and documentation firm in Weston, Mass. "Time spent testing is frequently perceived as time not in the marketplace," Brawley said. "There is tremendous pressure on our clients to deliver stuff to the market, whether or not it has been tested, and face the consequences."

Testing Not Budgeted

Until two years ago, many microcomputer hardware and even software makers "just didn't do software tests, period," said a West Coast consultant who asked not to be identified. "They'd bang on it [in-house] for a week or two and release it before it was done. Testing was never in the budget or time schedules."

Sigea Systems never intended to get into testing, but, Brawley said, "we've fallen into testing by virtue of products coming in to be documented and turning out not to be tested. For example, we had a job on a small financial package for the [Apple Computer, Inc.] computer, and the menus were so bad that a condition of our taking the documentation job was that we had to redesign the user interface."

Unfortunately, such poor quality could escalate tensions between users and DP as users continue to buy their own software, the West Coast consultant noted. "People will buy a lot of software packages that don't do what they want, then they'll turn to the DP department which will say, 'Well, you didn't ask us first.' But even if they had asked, the typical large corporation DP department isn't ready to answer the questions."

Consultants Urge Involvement Of More People in Testing Effort

Software consultants contacted recently by *Computerworld* differ on which software testing methods are best, but all agree that the more people involved in the process, the better the final product.

Testing is becoming even more of a concern as end users increase their involvement in program design and specification, consultants noted. "If you give a user a system that doesn't work 100% correctly on day one, they may see that as a system that will never work," said William R. Duncan, president of Duncan Associates, a consulting firm in Beverly, Mass.

One popular concept is software metrics, which uses an independent group for evaluation and testing. "It involves the whole cycle from requirements preparation to acceptance of the system at the end and includes a focus on general company standards, quality and output," explained Joseph Siroker, an independent consultant in Los Altos, Calif.

The advantage of the independent group is twofold, Siroker said. It eliminates the bias that is inherent in letting programmers test their own work. It also enforces company standards by creating a repository of information about development efforts.

"Another thing companies don't do is keep a log of the project and then go through a review with an eye toward profiling the company so that there is more data for estimation," Siroker said. "This is the purpose of the software metrics group."

For custom programming in particular, "it's essential to define a separate team to create test data, define inputs, create streams for job data entry and independently run the systems," said Jack Bader, vice-president of The User Group, Inc., a St. Louis-based consulting firm. The independent group can be made up of programmers or end users, Bader said, as long as the members can logically create and verify data.

"You're looking to do a beta test before you put the system in live," he said.

However, few shops now employ the concept of a separate testing group, "probably because they don't think it's cost-effective," Bader said. "But I submit that if you have one of these disastrous occurrences where you process for a whole month before you find an error, well, look at the costs involved to recover."

Many companies also pay too little attention to testing whole systems of software, focusing instead on individual modules, according to some of the consultants. "Testing a whole bunch of [small] programs doesn't mean a thing because it's not the individual programs that have problems," Siroker said. "It's the interaction between them that you're really trying to test."

Boris Beizer, a consultant and author of a book on software testing, believes all medium- to large-size programs should go through both structural testing and functional testing.

Structural testing is a precise method that follows from the details of the code. "Unit-level testing tends to be structural," he said. "It is very complete and thorough, but it can totally miss improperly implemented functions." But because structural testing requires knowledge of the program, it should be done by the programmer.

Functional testing occurs at the systems level and asks "are we doing the right thing?" rather than "did we do it right?" Beizer said.

Testing Better Out of House?

SUNNYVALE, Calif. — Testing software in-house often involves pulling good programmers off of urgent projects and asking them to perform a task they do not enjoy in the first place. For that reason, independent testing consultants are becoming an increasingly popular alternative.

One company here is attempting to establish itself as a kind of standard-setter for software testing, even going so far as to put a stamped seal of approval on packages it endorses. The International Bureau of Software Test (IBST) works mostly with software vendors, but its service could be used by nearly any DP shop, according to William Goss, company president.

The two-year-old company employs about 16 programmers and consultants who are devoted to running software against documentation, identifying bugs and recommending fixes. The firm also recommends ways to make packages more user-friendly, Goss said.

Among the most common problems IBST encounters are unclear documentation and procedures that revert to the operating system and lose data, Goss said. Inconsistency of action is another common flaw, a are poorly designed screens.

Different Perspective

Independent testing "relieves designers who are unhappy doing testing," Goss said. "We also look at [the software] from a different point of view. We have no ax to grind, no pride of authorship. We can find the things which the author might overlook or take for granted."

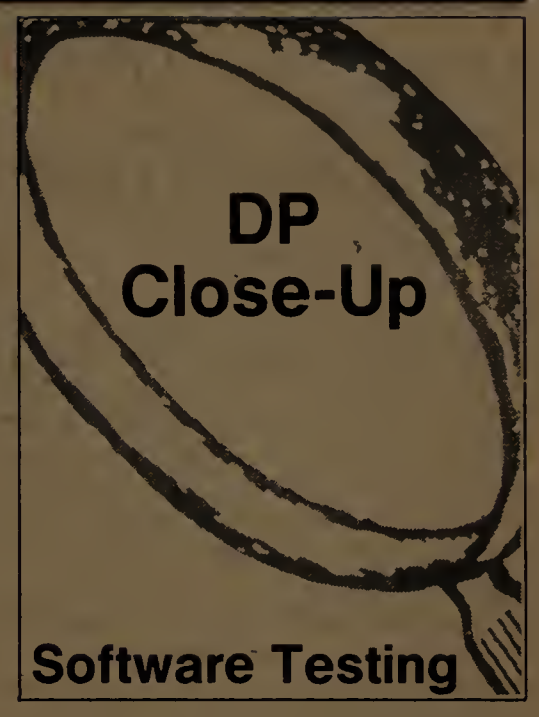
IBST charges by the hour for its services, and it has done jobs ranging from $750 to $20,000, Goss said. The firm uses a uniform base of test data for standard applications or will run custom tests. Customers receive a test book that provides all test cases, planned and scheduled performance, a list of files, tests and output and bug reports.

All testers work from a standard manual of test procedures, Goss said. The five available levels of testing can encompass testing, verification, validation, certification and comparison.

IBST claims its costs are competitive, and at least one customer agrees. "In the short term, it's probably cheaper for us to go to them," said Jack Hogan, manager of software development at General Electric Co. in San Jose, Calif. "What's important to us is having independent verification by somebody not involved with programming. We plan on using them for testing on another job," he said.

IBST is located at Suite 7, 536 Weddell Drive, Sunnyvale, Calif. 94086.

Testing, Debugging Low Priorities



(Continued from Page 1)

ten test software they have written, making a fair and exhaustive test impossible.

"If I wrote a program, my mind set isn't to find bugs — it's to prove that the program is correct," observed Joseph Siroker, an independent consultant based in Los Altos, Calif. "I am not a very good tester in that case."

"Most people do testing almost as an afterthought. And their single purpose is to demonstrate that the software works," added George Heidenrich, president of Sofqual Corp. in Briarcliff Manor, N.Y. "The purpose of testing really is to break it while you can still fix it."

Necessary Evil

Another problem is that testing is considered a necessary evil by many in DP. "When you start talking about testing and debugging, you start getting very nasty reactions from programmers and analysts," Beizer said. "Everyone from the individual programmer up to the technical director feels threatened by testing. The psychological problems that inhibit testing are the major barriers to developing effective methodologies."

Beizer said many managers do not understand testing and therefore regard it as a black hole in the development cycle. "Management has to stop saying, 'Well, here's 50% of the project we're just frittering away,' and recognize testing and quality assurance as line items."

He noted that "less than 5% of the literature of software is devoted to testing. And yet the bucks are spent 50-50 [between testing and programming]."

The solution, in Heidenrich's mind, "is to test smarter rather than harder." Decrying what he called "a whole lot of inertia in this business," he said that most programmers still look at testing as an afterthought. "A programmer writes the program, runs the test, picks up huge stacks of output and says, 'I guess it works.' "

DP needs to restructure its attitude toward programming in order to test more effectively, Heidenrich said. The first step is to gain a more realistic understanding of the organization's requirements. "DP is spending too much time trying to meet unrealistic requirements," he said. "A user says he can't afford to have the system go down, but maybe he can live with five minutes of downtime. There are a wide range of tolerances, rules that are unwritten but implicit," Heidenrich continued.

DPers also rely too heavily on output to make test decisions. "People assume they're testing because they're getting the proper result," Heidenrich said, "but you're really testing data paths through a processing system, and there are a lot of potential short circuits." An encouraging development has been the recent release of testing aids like Management and Computer Services, Inc.'s Tracmacs, which looks at data paths rather than output, the consultant noted.

"One thing you can do is cut the number of decisions in a given piece of code," he said. "If you keep that factor less than 10, you're much better off. Structured programming is absolutely a step in that direction, and structured walk-throughs are also absolutely necessary."

DPMA Expo To Hear Deken

BALTIMORE — The opening session of the 32nd Annual International Conference and Business Exposition of the Data Processing Management Association (DPMA) will feature a keynote address on artificial intelligence by Joseph Deken, author of *The Electronic Cottage*. The conference will be held here Oct. 30 to Nov. 2.

Deken, who holds a Ph.D. in statistics from Stanford University, previously taught at Princeton University and is currently on the faculty of the Statistics, Operations Research and Data Processing Division of the University of Texas' School of Business in Austin.

At the conference, more than 60 seminars will be organized in six tracks with seven separate presentations in each: General Management; Personal Development; Trends and Directions; Current Technical Concepts; Getting the Job Done; and Office Management Systems.

Registration fees are $325 for DPMA members and $375 for nonmembers.

More details can be obtained from Conference Manager, DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.

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THE SOFTWARE ENGINEERS

Links Over 1,000 Banks in 47 States

Consortium Launches National Net of ATMs

By Peter Bartolik
CW Staff

DENVER — A financial consortium launched a national network of automated teller machines (ATM) last month that links more than 1,000 banks and customers in 47 states. Called the Plus System, Inc., it is said to be the largest transcontinental network of computerized teller machines to date.

Six other national networks are at various stages of implementation; hundreds of regional networks are currently in operation.

Based here and backed by 34 major banking companies, the Plus System network presently consists of about 2,000 ATMs. However, the consortium plans to inflate that number to 3,000 by year-end and expects to have 10,000 ATMs installed within the next five years, according to Plus System's Executive Vice-President Denny Dumler. Dumler is also president of the Rocky Mountain Bank Card Association, a five-year-old regional ATM sharing network that has reportedly agreed to provide switching facilities to Plus System.

ATMs in the Plus Systm network — manufactured by IBM, Diebold, Inc., NCR Corp., Burroughs Corp. and Docutel Corp. — communicate over dedicated telephone lines with dual Perkin-Elmer Corp. Model 3241 superminicomputers based here. Transactions are passed through to the customer's bank via an IBM Series/1 minicomputer that interacts with the 3241s through specialized software provided by Systems Design and Development Corp. of Boulder, Colo.

According to Dumler, the Series/1 can interface with whatever system proprietary members are using: mainframe hosts, a regional switching station or a third-party processor. The network incorporates a code access security system that encrypts and decrypts transaction messages three separate times along the network, Dumler noted. The Atalla Security Module was developed by Atalla Corp. of San Jose, Calif.

Formed in April 1982, the Plus consortium is composed of 34 proprietary or "owner members," including Bank of America and Chase Manhattan Bank. Those founders sponsor other banking companies which are entitled to use the network but have no ownership interest in the organization.

Plus has a different approach from its leading competitors, Dumler said, in two ways. First, it is self-managing; proprietary members have elected a board from among themselves to manage the service. Second, it does not allow a proprietary license area to encompass more than one state.

In contrast, another ATM network called Cirrus, operated by Cirrus System, Inc., permits larger exclusive territories to proprietary members. The Exchange/ADP, still another ATM network, is operated by a third party processor for a profit since New Jersey-based Automatic Data Processing, Inc. (ADP) last year purchased the right to market on a national basis the regional network that had been formed by Pacific Northwest banks.

Two factors provide the motivation for banks to join a network, Dumler said: to bring "some national conveniences to customers" and the desire to be able to provide a service superior to what the competition offers.

Asked if the use of ATMs is also a means of slipping around the federal laws and regulations that empower states to prohibit interstate banking, Dumler replied, "Certainly." William R. Moroney, president of the Electronic Funds Transfer Association agreed, telling *Computerworld* that national and regional networks "make prohibitions against interstate banking a little more ludicrous . . . With ATMs, there is very little that banks can't do for customers across state lines."

Both Moroney and Sheldon B. Golub, assistant public relations director for the American Banking Association, believe that the true value of AMT networks may be in what they promise for the future. Banks, Golub said, "are putting into effect technology which later on down the road may be propitious." Moroney predicted, "In the next two or three years, I think we're going to see a number of (ATM) hybrids."

Number of ATMs Skyrockets

In an era sometimes called the dawn of the cashless society, banks seem to be falling all over each other in the rush to provide cash to customers, wherever they may be, through the magic of automated teller machine (ATM) networks.

"There are almost a couple of hundred shared ATM networks of some fashion," noted William R. Moroney, president of the Electronic Funds Transfer Association (Efta), a Washington, D.C.-based trade association whose members come from the fields of finance, data processing, telecommunications and retailing.

Sheldon B. Golub, assistant public relations director for the American Bankers Association, believes "there could be as many as 500 different networks . . . there's so much movement in this area that it's almost impossible to get a reading on how many there are."

What is clear is that there has been a phenomenal growth in the sale and installation of ATMs, with Diebold, Inc., providing about 50% of the total. IBM, Docutel Corp., NCR Corp. and others divvy up the rest of the market. Only 2,000 ATMs were in use in 1973, Golub said; now there are an estimated 36,000.

Moreover, Moroney said, "half the total number [of ATMs] have been installed in the last 12 to 18 months, so you can see there's an accelerated curve."

In the past year, there has been rapid development of national networks, but just which is No. 1 is hard to determine:

- Plus System, Inc. last month activated what some reports termed "the first [ATM] system to go transcontinental." Plus System has 34 proprietary members, including Bank of America and Chase Manhattan Bank, and more than 1,000 institutions who have been sponsored as members, according to Executive Vice-President Denny Dumler. Customers of each member institution have access to funds through about 2,000 ATMs in 47 states.
- Thomas Bass, president of The Exchange in the Pacific Northwest, claimed the first national coast-to-coast system late last year, after a marketing arrangement with Automated Data Processing, Inc. of New Jersey, hooked up 14 states in a system stretching to Florida [CW, Dec. 6]. As of June, according to ADP marketing representative Marianne Simpson, 534 institutions with 1,867 ATMs in 33 states were "committed" to The Exchange/ADP.
- Cirrus System, Inc., the Chicago network with Manufacturers Hanover Trust and First Interstate Bank Corp. among its members, will have 930 members with a total of 5,000 ATMs in 41 states by the end of 1983, according to Cirrus Sales Manager Henry Lunt.
- Then there is Nationet, Inc., which has linked several regional networks. According to Executive Director Paul Kramme, Nationet encompasses 3,300 participating institutions covering 25 states with 4,500-4,600 ATMs, including Tyme Corp. of Wisconsin and Iowa Transfer System, Inc., both of which have approximately 450 ATMs.
- And, according to Efta's Moroney, the credit card giants of American Express, Mastercard International and Visa USA all are attempting to build their own networks.

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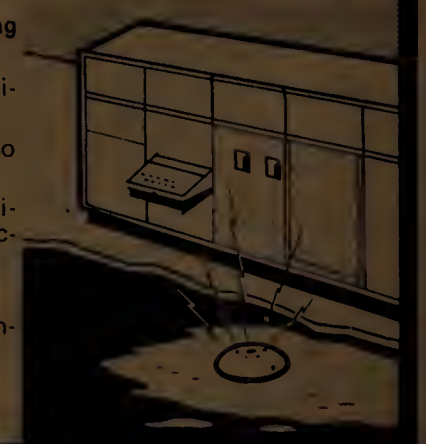

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Datacomm Briefs

Justice Takes Stand On BOC Payment

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Department of Justice said last week that AT&T should not be required to reimburse the divested Bell operating companies for losses they may incur in reconfiguring their networks to comply with settlement of the government's antitrust case against the phone company.

The settlement agreement requires the Bell operating companies to install new switches and to string new lines between their wire centers and the end points of long-distance carrier networks. AT&T has estimated the total cost at more than $3 billion.

The Bell operating companies will try to get this money back from the long-distance carriers by imposing access charges on them. Last month, however, Judge Harold Greene, who is presiding over implementation of the settlement, indicated this plan might not work; the long-distance carriers might evade the charges by using bypass facilities, for example.

Greene, therefore, said that if the Bell operating companies have not recovered their reconfiguration costs by the beginning of 1994, AT&T would have to make up the loss. AT&T objected, maintaining that Greene's order would encourage the Bell operating companies and/or state regulators to impose lower access charges on the long-distance carriers. This would reduce the bypass threat, according to the phone company, but would force AT&T to pay more than its fair share.

The Department of Justice agreed, pointing out that if AT&T is not required to insure the Bell operating companies against loss, they, as well as state regulators, will "have every incentive to ensure" that the costs are recovered from access charges imposed on long-distance carriers.

AT&T Proposes Conference Service

WASHINGTON, D.C. — AT&T last week proposed an international video teleconferencing service based on the use of digital circuits and data compression. If the service is approved by the Federal Communications Commission, it will begin in September between New York City and London.

The service is being offered jointly by AT&T and British Telecommunications International. Each carrier will charge $712.50 for a 30-minute teleconference. A lower rate — $612 — will be charged if the customer's signal is delivered in digital form.

Although international video teleconferencing service already is available, it costs much more than the proposed service. One reason for the reduced price is its data compression scheme: Only the changing information in each frame will be transmitted rather than the whole picture.

Citicorp Opposed In Bid as Carrier

WASHINGTON, D.C. — Plans by Citicorp, the New York-based banking conglomerate, to become a communications carrier are being opposed by a prospective competitor.

Icom, Inc. of Parsippany, N.J., has asked the Federal Reserve Board to issue a cease and desist order barring Citicorp's subsidiary, Citicorp Digital Exchange, Inc. (CDE), from moving ahead with plans to build digital termination systems in several cities, including five where Icom plans to establish competing facilities (New York, Chicago, Dallas, San Francisco and Houston).

In a petition filed with the Fed earlier this month, Icom contended that "although Citicorp has been authorized by the Board to conduct certain strictly limited data transmission activities . . . [it] has never received Board authorization to . . . include the type of common carrier service it is now proposing to offer through CDE."

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H803-00/XE	266 PIN CONNECTOR	20 00	15.00	25 00
H8030-00/XE	CONN BLK 72PIN DBL HGHT NTCHD	9.00	5 00	66 66
H808-00/XE	CONNECTOR BLOCK	25.00	18 00	24 00
H610-00/XE	WIRE WRAP HAND TOOL	120 00	80 00	50 00
H613-00/XE	#24 BIT	46.00	23 00	50 00
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H863-00/XE	CONNECTOR BLOCK, NOTCHED	20 00	15 00	25 00
H8821-00/XE	5012414	65.00	43 00	48 41
H8822-00/XE	50-12683,12-13508-01,12-13508	282 00	141 00	50 00
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K113-00/XE	TWO INPUT NAND GATES	29 00	15 00	48 27
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M8266-00/XE	CONTROL,HEX (KD11EA)	2,459 00	1,230 00	49 97
M8291-00/XE	CR11 CM11 CONTROL	1,121.00	561 00	48 95
M8294-00/XE	32K TIMING UNIBUS INTEFACE	506 00	253 00	50 00
M8298-00/XE	DR780 MICROPROCESSOR	6,067 00	3,034 00	49 99
M8320-00/XE	LOADS, BUS	223 00	145 00	34 97
M8331-00/XE	CASSETTE INTERFACE	1,139 00	570 00	49 95
M8333-00/XE	ASYNCHRONOUS SERIAL CHANNEL	1,152 00	576 00	50 00
M8342-00/XE	LSB-E PARALLEL CONT-WILL REPL	759 00	380 00	49 93
M841-00/XE	CONTROL, LINE PRINTER	649 00	325 00	49 92
M8522-00/XE	TR D RAM AND CARRY KL10	3,375 00	1,689 00	49 96
M8540-00/XE	MODULE SHIFT MATRIX	1,458 00	729 00	50 00
M8559-00/XE	CLOCK DISTRIBUTION	1,507 00	1,000 00	33 64
M8574-00/XE	WRITE PATH MF20	2,254 00	1,127 00	50 00
M8576-00/XE	MOS MEMORY CONTROL	1,848 00	924 00	50 00
M8619-00/XE	KS10 UNIBUS ADAPTER	5,146 00	2,573 00	50 00
M8657-YA/XE	VT71 CONTROL SECTION	679 00	340 00	49 92
M8658-YA/XE	VT71 VIDEO	1,070 00	535 00	50 00
M866-00/XE	SYNCH MODEM INTERFACE	575 00	268 00	49 91
M882-00/XE	CLOCK, DK8-EA REAL TIME/LINE	365 00	183 00	49 66
M9048-00/XE	DR780 PADDLE CARD, HEX 12	265 00	133 00	49 61
M906-00/XE	CABLE TERMINATOR	257 00	129 00	49 80
M908-00/XE	CONNECTOR MODULE	75 00	38 00	49 33
M9760-00/XE	M976 WITH FILTERS	88 00	44 00	50 00
M993-00/XE	CABLE CONTROL (RK8-E)	39 00	30 00	23 07
MA20-M/XE	16KX18 BIT MEM MOD SET	6,518 00	3,259 00	50 00
MB20-M/XE	MEMORY 32K X 18	6,888 00	4 444 00	50 00
MF10-M/XE	8K X 18 MEMORY FOR MF10	5,667 00	2,834 00	49 99
R602-00/XE	PULSE AMPLIFIER	300 00	150 00	50 00
SDKC8-AA/XE	DKC8-AA SPARE MOD KIT(M8316)	790 00	395 00	50 00
SKD11-D/XE	KD11-D SPARE MOD KIT(M7263)	$2,270 00	$1,135 00	50 00
SMS10-BA/XE	MS10-BA SPARE MEM (M8629-BA)	6,000 00	3,000 00	50 00
SMS11-CP/XE	MS11-CP SPARE MEM (M8111-YA)	4,160 00	2,080 00	50 00
SPAAV-A/XE	AAV11-A SPARE MOD KIT (A6001)	1,500 00	750 00	50 00
SPKL8-JA/XE	KL8-JA SPARE MODULE KIT(M8655)	645 00	323 00	49 92
SPMS8-CA/XE	MS8-CA SPARE MEM (M8417-AA)	2,050 00	1,025 00	50 00
SPMSV-B/XE	MSV11-B SPARE MEM KIT (M7944)	670 00	335 00	50 00
SPMSV-DC/XE	MSV11-DC SPARE MEM (M8044-CA)	500 00	250 00	50 00
SPRL8-A/XE	RL8-A SPARE MODULE (M8433)	1,720 00	860 00	50 00
W9042-00/XE	FP11-A EXTENDER BOARD	265 00	133 00	49 81
10-09434-00/XE	5500 MFD 40V G% 36D AL E	9 00	5 00	44 44
12-10355-00/XE	BEARING FLANGED BALL #S3NPPB5	13.00	7 00	46 15
12-10356-00/XE	BEARING,BALL 9MMX26MM	14 00	7 00	50 00
12-10489-00/XE	CKT BKR 6 0 A 65V 1P MAGNET	32 00	18 00	50 00
12-10496-00/XE	BUMPER #2 SOLENOID LA30	28 00	14 00	50 00
12-11456-00/XE	SW,KEY BD CAP KIT W LEGENDS,	50 00	25 00	50 00
12-11825-00/XE	SLIDE,CHASSIS TILT 3POSITION	143 00	72 00	49 65
12-12354-00/XE	BEARING,BALL,FLANGED,5000D 2	16 00	8 00	50 00
12-12581-00/XE	FAN, 35CFM,115VAC,3" DIA W/GUA	44 00	22 00	50 00
12-14333-WE/XE	KEYCAP SET,VT102/131	36 00	18 00	50 00
12-15296-01/XE	BASE,HOUSING-OUTER SKIN	22 00	11 00	50 00
12-18089-01/XE	KEYBOARD, 123 KEYS FOR LK09-D	420 00	273.00	35.00
12-18089-02/XE	KEYBOARD, 123 KEYS FOR LK09-E	420 00	210 00	50 00
12-18987-00/XE	POWER SUPPLY, SWITCHING	328 00	164 00	50 00
16-12256-00/XE	XFMRF P = AB S = 42DC@2.67A + 80H	152 00	99 00	34 66
19-14710-00/XE	DC 636 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14711-00/XE	DC 637 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14712-00/XE	DC 638 BIPOLAR,LS,400-GAT	131 00	66 00	46 61
19-14713-00/XE	DC 639 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14715-00/XE	DC 641 BIPOLAR,LS,400-GAT	131 00	66 00	49 81
19-14716-00/XE	DC 642 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14717-00/XE	DC 643 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
18-14717-00/XE	DC 643 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14719-00/XE	DC 845 BIPOLAR,LS,400-GAT	131 00	66 00	48 81
19-14720-00/XE	DC 646 BIPOLAR,LS,400-GAT	131 00	66 00	49 81
19-14721-00/XE	DC 647 BIPOLAR,LS,400-GAT	131 00	66 00	49 61
19-14722-00/XE	DC 648 BIPOLAR,LS,400-GAT	131 00	66 00	49 81
19-14723-00/XE	DC 649 BIPOLAR,LS,400-GAT	131 00	66 00	48 81
23-18A9-00/XE	A9-01	39 00	20 00	46 71
23-215A2-00/XE	A2-02,A2-04	24 00	12 00	50 00
23-216A2-00/XE	A2-02,A2-04	24 00	12 00	50 00
23-217A2-00/XE	A2-02,A2-04	24 00	12 00	50 00
23-218A2-00/XE	A2-02,A2-04	24 00	12 00	50 00
23-62A1-00/XE	A1-01,A1-03,A1-04,A1-05	18 00	9 00	50 00
23-63A1-00/XE	A1-01,A1-03,A1-04,A1-05	21 00	11 00	47 61
23-63A1-00/XE	A1-01,A1-03,A1-04,A1-05	21 00	11 00	47 61
23-70A6-00/XE	A6-01	32 00	16 00	50 00
23-73A1-00/XE	A1-01,A1-03,A1-05	21 00	11 00	47 61
23-87-01/XE	1024X 8 ,MOS UV ER,PROM,TRI	117 00	59 00	49 57
29-16510-00/XE	PCBA CLOCK	563 00	282 00	48 91
29-18511-00/XE	PCBA CONTROL	422 00	211 00	50 00
29-18512-00/XE	PCBA ERROR	555 00	278 00	49 90
29-16513-00/XE	PCBA SYNC	645 00	323 00	49 82
29-19558-00/XE	WAND, DISK CLEANING 12 EACH	3 00	2 00	33 33
29-19572-00/XE	HEAD ASSY	799 00	400 00	49 93
29-20916-00/XE	CORD POWER	23 00	12 00	47 82
29-21139-00/XE	TRANSFORMER	253 00	127 00	49 80
29-21295-00/XE	PCBA PE 55-84 IPS	138 00	69 00	50 00
29-21865-00/XE	COIL, HAMMER BANK	493 00	247 00	49 89
29-21895-00/XE	SWITCH ASSY FORM SLCT	313 00	157 00	49 64
29-22172-00/XE	CABLE ASSY, SERVO CONTROL	241 00	107 00	50 00
29-22234-00/XE	PCBA POSITION SERVO	1,193 00	776 00	34 95
29-22341-00/XE	PCBA AC-29 COLUMN COUNT	313 00	157 00	49 84
29-23072-00/XE	CONTROL PANEL ASSY	329 00	247 00	24 92
29-24078-00/XE	SENSOR KIT	275 00	136 00	49 61
30-12538-00/XE	KEYBOARD,LK05, 112 KEYS,12 LE	1,344 00	672 00	50 00
30-12538-01/XE	KEYBOARD FOR VT71	738 00	369 00	50 00
30-14590-01/XE	XFMR,HORZ,FLYBACK(BALL BROS)	116 00	58 00	50 00
30-17205-01/XE	P.S. SWITCH,(5V 6A)	193 00	97 00	49 74
54-10893-00/XE	KEYBOARD A (VT50-AA)	758 00	378 00	50 00
54-10902-00/XE	PROC UART ROM (VT50AA)	1,048 00	542 00	50 00
54-10906-00/XE	PROC DATA PATH (VT50-AA)	1,324 00	662 00	50 00
54-11023-00/XE	LA180 PCB W/COUNT ROM	507 00	330 00	34 91
54-11023-02/XE	LA180/LS120 PCB W/O ROMS	498 00	248 00	50 00
54-11040-00/XE	CAPACITOR BRD RK06	565 00	283 00	49 91
54-11170-00/XE	VT61 KEYBOARD	330 00	215 00	34 64
54-11668-00/XE	MOTHER BRD	170 00	111 00	34 70
54-11736-00/XE	POWER BOARD LA180	542 00	407 00	24 90
54-12530-00/XE	MASTER BOARD	420 00	273 00	35 00
54-13782-00/XE	EXPANDED MEMORY LA34	246 00	123 00	50 00
54-13951-00/XE	ADAPTER BOARD	506 00	253 00	50 00
54-13951-00/XE	ADAPTER BOARD	506 00	253 00	50 00
54-14185-00/XE	VT101 TERMINAL CONTROL	884 00	253 00	71 36
54-14185-00/XE	VT101 TERMINAL CONTROL	884.00	253 00	71 36
54-15150-00/XE	VT180 PADDLE BOARD	86 00	43 00	50 00
54-15152-AA/XE	VT18X CONTROL MODULE	830 00	415 00	50 00
70-05517-00/XE	FAN MTG BRKT ASSY	480 00	240 00	50 00
70-06993-00/XE	HARNESS, POWER (PDP 8/E)	36 00	16 00	50 00
70-07088-00/XE	YOKE ASSY (VR14)	397 00	199 00	49 67
70-08859-00/XE	CENTRONICS PRINTER INTERFACE	135 00	66 00	34 61
70-09779-02/XE	XFORMER ASSY	146 00	95 00	34 93
70-10935-02/XE	TRANSFORMER ASSY 50HZ	394 00	197 00	50 00
70-11525-00/XE	LA36 CONTROL PANEL	58 00	29 00	50 00
70-13585-02/XE	TE 16 7 TRACK NARROW RADIUS	1,935 00	968 00	49 97
70-14115-01/XE	54-12610-01 LOGIC BOARD ASSY	604 00	303 00	49 83
70-14296-00/XE	CONE LIFT COVER ASSY	99 00	50 00	49 49
70-15343-00/XE	SOLENOID ASSY	24 00	17 00	29 16
70-15503-00/XE	20MA LOOPBACK	10 00	5 00	50 00
70-15514-03/XE	KEYBOARD KEYCAP ASSY LA34-AA	122 00	79 00	35 24
70-16530-00/XE	PWR ENTRY ASSY "SWITCHER"	113 00	57 00	49 55
70-16799-00/XE	KEYPAD ASSY,LA120 R/O,BROWN	108 00	61 00	25 00
70-17148-00/XE	XFRMR HOUSING ASSY VT101	111 00	58 00	49 54
70-17374-00/XE	P.S. BD & AC INPUT BOX ASSY	229 00	115 00	49 78
70-17826-00/XE	RIBBON CHASIS ASSY LA120	57 00	43 00	24 56
74-07979-00/XE	KNOB	51 00	26 00	49 01
74-09418-02/XE	PULLEY,MOTOR	7 00	6 00	14 26
74-10768-00/XE	FILTER SIDE PLR	13 00	7 00	46 15
74-10881-00/XE	SOLENOID ASSY	22 00	15 00	31 81
74-11069-00/XE	WASHER ECCENTRIC LA36 (74-115)	3 00	2 00	33 33
74-11416-00/XE	ENCODER DUST COVER	4 00	2 00	50 00
74-11578-00/XE	RIBBON ECCENTRIC/CLUTCH (LA36)	9 00	5 00	44 44
74-18355-00/XE	PULLER KEYCAP	3 00	2 00	33 33
74-21078-01/XE	PULLET,RX01 MOTOR,50HZ			

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Head of UK's 'Alvey Directorate' Details Plan

By Susan Blakeney
CW Staff

ST. PAUL DE VENCE, France — "Cartels for economic disarmament" is what Brian Oakley calls fifth-generation computer projects.

Oakley is the head of the recently established Alvey Directorate in London, the UK's five-year technology research project. The directorate is a collaborative composed of members of industry, academia and government. Alvey's specific purpose, Oakley said at a "Seminar for the Press" held here recently by Sperry Corp., is to examine four basic areas of technology: very large-scale integration (VLSI), knowledge-based or expert-type systems, the man-machine interface and software.

Oakley predicted that the future of VLSI technology will be governed by three basic principles:

- Moore's Law: The complexity of a chip doubles every year.
- Cost Law: The costs per memory unit have decreased about every six years.
- Smaller device dimensions lead to higher speed, lower prices and fewer impurities.

The trend toward smaller devices is also fueled by increasing consumer demand for more portable systems, Oakley added.

Oakley holds little hope that the UK will even come close to beating Japan in the development of the supercomputer or expert system. When asked why the UK did not team up with its Japanese rivals, Oakley replied, "We'd get raped."

Alvey's man-machine interface research "will most likely be the most visible part of the Alvey program," Oakley said. He argued that the future of the interface would be determined by the demise of the cathode ray tube and by the growing pervasiveness of speech input and voice output.

In terms of a computer interface with general hearing and interpretative speech capabilities, Oakley was quick to warn that "we've got a hell of a long wait." He maintained, however, that speech input and output is the direction the Alvey Directorate is pursuing for an interface.

When Oakley broached the subject of Alvey's software research and development, he remarked that "there's a very great deal to be done here." He suggested, in fact, that there is so much work to be done in this area that "people will look back on this period in awe and in horror, the way we look back on early engineering." He maintained that these formative years are the most difficult and that standards are badly needed.

The field of software, he admitted, is currently led and dominated by the U.S., a fact Oakley attributed to "either a fear of the Soviet bloc or of the Japanese threat." However, he concluded his talk on an optimistic note. "We [the UK] can do well in this market," he said.

Proliferation of EFT Called 'Unstoppable' By Chief of Telecommunications Firm

By Susan Blakeney
CW Staff

ST. PAUL DE VENCE, France — Michael Rappolt compared electronic funds transfer (EFT) to the nuclear arms race, calling it "an unstoppable bandwagon of vested interests with the majority of us not even bothering to think about the broad social and economic implications."

Rappolt, director of the Complex Systems Division of London's PA Computers & Telecommunications, spoke at Sperry Corp.'s "Seminar for the Press," which was held here recently.

Rappolt noted that "the key trend over the next 10 years or so will be the availability of intelligent switched networks, on both a local and a wide-area basis." These networks will store information, convert data and interlink almost every type of device from simple terminals to video conference systems, he maintained.

"They will carry voice, data, text and image, using satellites to interlink key financial centers around the world. Developments in cable TV and satellite services will make it possible for these networks to be accessed from the home. Developments in cellular radio and FM sideband techniques will also allow these networks to be accessed on a mobile basis."

Eightfold Growth

Citing statistics from the American Bankers Association, Rappolt said that annual electronic transactions will leap from 2 billion in 1981 to 16 billion in 1986 — an eightfold growth.

This explosive increase, he contended, will spark fierce competition among financial institutions, and related companies will jump into the game as well.

According to Rappolt, the financial industry is only on the threshold of an era in which banks will have to compete head-on with third-party computer service groups, in addition to traditional computer and communications vendors.

"Third-party firms will continue to provide centrally located computer 'switches' to route money transfers from one place to another, and they will build on these systems to develop information products for customers," he said.

The structural changes in the financial industry will be immense and will become increasingly more pronounced over the next decade. "Time-honored divisions of functions are all but disappearing. 'One-stop' or 'supermarket' financial services for 'the whole client' — both the corporate and the individual — are the goal, as typified by [Merrill Lynch & Co.]," he said.

However, Rappolt noted that there are several obstacles to EFT to be overcome. Two of those obstacles are security and cultural considerations.

"The Fraud Squad of the Metropolitan Police [in London] — which occupies eight floors of a building — recently set up a specialized computer crime unit. The head of that unit is reported as stating that in 10 years' time, every fraud investigated in the building will be a computer fraud," Rappolt said.

To minimize risks, Rappolt claimed the industry is relying mainly on secret codes and encryption. "But at present," he argued, "it seems that the levels of security in the financial market systems are not, in practice, all that high."

He said there is an urgent need to develop more comprehensive security features and facilities for EFT systems to protect the financial houses and, more importantly, convince the end users to put their trust in them.

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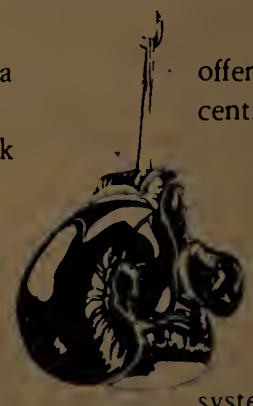

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HP 1000 Users Meeting Scheduled for Oct. 18-21

FORT WORTH, Texas — Users of the Hewlett-Packard Co. HP 1000 will meet here Oct. 18-21 for their sixth international conference.

The theme of the HP 1000 International Users Group (HP 1000 IUG) conference is "New Frontiers." During the four-day meet, users will discuss professional tips, tricks and techniques to clear the way to higher system performance.

In addition, delegates will deliver technical papers on topics such as computation, instrumentation, systems software, data communications and operations.

HP personnel will present educational tutorials on RTE, data communications, Systemsafe/1000 and a number of other subjects.

There will also be a question-and-answer forum during which HP managers will respond to delegates' questions on product services and development. Additionally, a vendor exhibit will run throughout the conference.

The HP 1000 IUG is an independent, nonprofit association. Besides its annual international conference, it offers members a bimonthly technical magazine called *TC Interface* and a library of contributed software.

Full conference registration will cost $300. More information is available from HP 1000 IUG, 289 S. San Antonio Road, Los Altos, Calif. 94022.

International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

RUSHCUTTERS BAY — Gestetner Pty. Ltd. plans to replace its one-year-old IBM System/38 with equipment from Prime Computer, Inc. because of the high cost of software development and the difficulty of tailoring the IBM machine to its own requirements. The company had upgraded to the System/38 only a year ago from a System/34 because it was unaware of the impending announcement of the IBM System/36, Mike Sulkin, Gestetner managing director, said.

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PYMBLE — Despite a lack of venture capital funds in Australia, Digital Electronics Pty. Ltd. has acquired over $400,000 in funding from a newly formed venture capital company called Business Loans and Equity Capital Ltd. The money has reportedly been earmarked for marketing Digital Electronics' existing product line.

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MELBOURNE — A software productivity aid for creating and modifying test data on an on-line basis for use with DL/1 data bases under IBM's CICS was developed here by Peter Simons, a software specialist. "There were IBM batch utilities, but nothing specifically on-line to access DL/1 segments," Simons said. "This meant a two- or three-hour delay when testing programs." The utility software reportedly allows the user to change the data easily or inspect the results on-line.

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ADELAIDE — The South Australian Public Service Board has awarded preferred supplier status to SI Products (Australia) Pty. Ltd. After competing head-on with American software houses, including Management Science America, Inc. and McCormack and Dodge Corp., SI's financial software was chosen for 20 Australian government departments.

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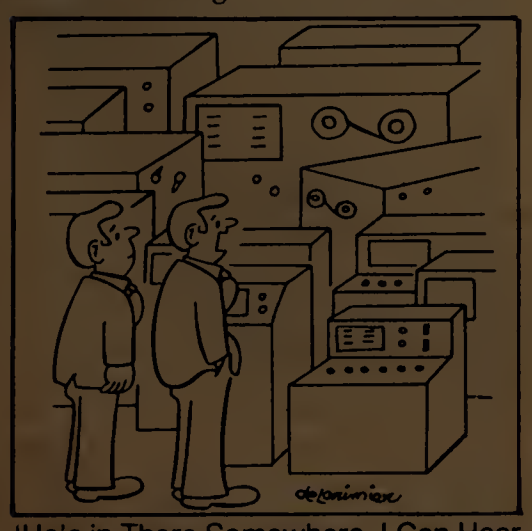
CANBERRA — A federal government contract for microcomputers valued at over $1 million is up for grabs. The Australian Computer Equipment Manufacturers Association has voiced concern that the contract might be lost to a foreign manufacturer.

FRANCE

PARIS — The number of data processing sites in France as of Jan. 1 was 134,317, the French Association of Data Processing and Office Automation Equipment Manufacturers determined after surveying manufacturers and importers. The breakdown: 92,479 microcomputers and small business systems; 36,686 minicomputers; and 5,152 medium- to large-scale processors. The total dollar value of these installations was estimated at $926 million.



'He's in There Somewhere. I Can Hear Him Sobbing.'

JAPAN

TOKYO — Hitachi Ltd. has introduced two products here that are said to fill the gap between main memory and disk drives. The first product, H-3538-CI, is a disk controller with cache memory; it is reportedly similar to IBM's 3880-13 and supports Hitachi's IBM 3380 equivalent, the H-8598 disk drive. The second product, Hitachi's H-6915-1 solid-state disk drive (SSD), has a memory capacity ranging from 32M to 128M bytes, with access time of .3 nsec using 64K-bit chip technology, Hitachi said. The SSD will reportedly not be marketed to users of IBM's MVS and VM systems, but only to users of Hitachi's operating systems, VOS3 and VM. Industry watchers contended that SSD could become a strong weapon in the war to resolve very large memory requirements.

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TOKYO — IBM Japan, Mitsubishi Corp. and Cosmo Eighty Corp. have signed an agreement to establish two new joint venture companies that will concentrate on digital communications network technology. The start-ups, whose main goal is to compete with Nippon Telegraph and Telephone Public Corp. in the communications marketplace, are expected to begin operations in October. For IBM Japan, this marks the fourth partnership venture with other Japanese firms. Industry watchers predicted that IBM's fifth move will come in the near future to develop Japanese personal computers with Matsushita Electric Corp.

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TOKYO — Panafacom Ltd., a computer company owned jointly by Fujitsu Ltd. and Matsushita Electric Industrial Co. Ltd., will increase production of its PFC-200 personal computer, which was announced last April to compete against the IBM Personal Computer. Panafacom plans to manufacture approximately 2,500 units per month as of September.

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TOKYO — The custom software and applications software markets showed the most rapid growth in Japan's information service industry in 1982, according to a survey conducted by the Ministry of International Trade and Industry. The survey indicated that service bureau companies and software houses increased their profits by 31.9% to $1.36 million. In contrast, the data entry market grew only 7% to $381 million; consulting services increased 23.2% to $402 million; and data base services declined by 13% to $238 million. The total 1982 DP industry was valued at $4.1 billion, which represents growth of 13.2% over the previous year.

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TOKYO — NEC Corp. unveiled a proprietary standard for its line of integrated office automation equipment. The standard for message formatting and protocols is called Office Automation Architecture. According to a company spokesman, the greatest attribute of the new architecture is wider support for Kanzi characters and an ability to handle image and voice processing in addition to word and data processing.

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TOKYO — Mitsumi Electric Co. Ltd., an electronics manufacturer for home appliances and office automation, has joined forces with Commodore Electronics Ltd. to establish a company specializing in peripherals for home computers. The company, Newtronics Co. Ltd., will produce floppy disk drives. First shipments are scheduled for October.

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TOKYO — Nippon Univac Kaisha Ltd. has reorganized its office automation operations — which include small business computers, personal computers, word processors and data entry equipment — and formed a new subsidiary called Nippon Univac Information Systems Kaisha, Ltd.

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TOKYO — Japan Information Services, Ltd., one of Japan's largest service bureau companies, is reportedly replacing all its large mainframes with newer models in order to keep up with user requirements for more on-line services. The firm is expected to install two Hitachi Ltd. H-8690 systems and IBM 3083 and 3033 systems.

WEST GERMANY

DUSSELDORF — The Supreme Court of West Germany has sentenced Gennadi A. Batashev to prison for 2½ years. Batashev, a member of the Soviet Representation of Commerce in Cologne, was accused of high-technology spying for the Russian Secret Service. Batashev reportedly was trying to procure circuit designs from Racal Milgo GMBH of some data encoding equipment called "Datacryptor" that is being used by North Atlantic Treaty Organization officials.

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FRANKFURT — The small business systems industry here seems to be playing a game of economic musical chairs: After going bankrupt, David Computer GMBH was absorbed by Swedish Ericsson; the Norwegian Norsk Data A.S. has taken over 80% of Dietz Computer Systems AG; and HPR Computer GMBH, formerly Hermes Precisa Rug GMBH, has filed a petition for liquidation.

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Lockheed Makes DP Personnel Moves, Layoffs

By Jeffry Beeler
And Lois Paul
CW Staff

SUNNYVALE, Calif. — A major aerospace company has laid off a small fraction of its information processing staff and has reassigned about a dozen other such employees in a purported effort to boost its systems productivity.

Reports of the personnel moves at Lockheed Missiles and Space Co. first surfaced during late June and were later confirmed by one of the firm's press contacts, Liz Jackson. During a July 21 phone conversation, Jackson estimated the total cut in Lockheed's systems staff at 36.

Of that number, "fewer than two dozen" have been identified as "surplus" employees and, therefore, are being let go, Jackson said. The remaining dozen or so systems staffers were given the option of seeking other, non-DP-related positions elsewhere within Lockheed.

Most of the reassigned employees are said to have already accepted replacement jobs in the user departments they formerly supported. "They [the ex-systems people] were mostly programmers and probably had contacts in the user departments who knew of openings there and helped them get new jobs," Jackson speculated.

A layoff/reassignment of three dozen computing specialists would deplete by only about 2% the manpower in Lockheed's information processing organization, whose staff totals roughly 1,700, she added.

The motive behind Lockheed's recent personnel shuffle reportedly is to streamline the firm's internal systems operations. "We're in a constant state of change here, and we're always on the lookout for ways to improve our efficiency," Jackson said. "This is one of those cases where we simply found more efficient means of doing things.

"People working here are continually being made available for reassignment and are going to other areas where their skills are needed more. In this instance, there was just no longer a call for us to hold on to about two dozen people in information processing."

Asked whether the layoffs and reassignments coincided with the completion of a major systems development project, Jackson replied with an emphatic "No."

Another Explanation?

Jackson's explanation for the recent personnel moves conflicts sharply with a theory advanced by a well-placed source who continues to work in Lockheed's Information Processing Department. The source, who asked not to be identified, described the layoffs and reassignments as an economizing move aimed at offsetting the high cost of transferring employees to a newly opened Lockheed Division in Austin, Texas.

Jackson flatly denied any connection between the job cutbacks in Lockheed's information processing area and the recent startup of the company's Austin division.

Word of the personnel changes began circulating inside Lockheed on June 10, when the company issued a "Notification of Availability for Reassignment" to selected members of its systems organization. Signed by Product Data Systems Manager R.E. Wasson, the document voiced "regret" about the reassignments, which it blamed simply on a "decrease in . . . personnel requirements."

Although Lockheed promised in its notification "to make every effort" to find replacement jobs for the surplus DPers, the memo contained a blunt warning: "In the event that no placement is possible, it will be necessary to lay you off on June 17, 1983."

One of the recipients of the reassignment notice was data systems programmer George Morrone, who worked in Lockheed's information processing organization for four years until he was laid off on June 17. Morrone characterized Lockheed's handling of the personnel reassignments as "pretty bad." The firm gave him and other recipients of the memo only a week's notice of their impending job changes and "made no attempt to explain" the layoffs other than to cite unspecified "budget cuts," he said.

In Morrone's own immediate work group, Lockheed was forced to lay off six programmers, primarily because the unit "blew [its] budget for the whole year by April 30," he said.

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DP Crime Prevention Bill Gains Momentum in House

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A recently introduced bill to help small businesses deter computer crime has gained considerable momentum in the few weeks since it was introduced, garnering support from industry, law enforcement and computer crime experts.

Rep. Ron Wyden (D-Ore.), sponsor of the Small Business Computer Crime Prevention Act, has been pushing the legislation hard, and his efforts to get the bill on the legislative fast track have started to pay off. Introduced only a month and a half ago [CW, June 13], the bill has already received the support of the relevant House of Representatives subcommittee chairman, who quickly scheduled a hearing on the bill.

Rep. Thomas A. Luken (D-Ohio), chairman of the House Small Business Subcommittee on Antitrust and Restraint of Trade Activities Affecting Small Business, said at the July hearing that "we are very serious about [the bill], and I'm hopeful that we will move this bill or something akin to it."

The bill would establish a federal task force to study the problem of computer crimes in small businesses and recommend appropriate security measures. It would also direct the Small Business Administration to set up an information clearinghouse to help small businesses protect themselves.

At the hearing, Wyden announced that his bill has received the support of the International Association of Computer Crime Investigators. In addition, according to Wyden and Dr. Stuart A. Katzke, an official with the National Bureau of Standards' Institute for Computer Sciences and Technology, the Reagan administration, which generally opposes increased government intrusion into private-sector matters, has so far decided to remain neutral on the bill.

Wyden further said he will amend the bill so that the task force would have to complete its work within 18 months rather than the three-year period now contained in the bill. The shorter time is necessary, he said, because of the seriousness of the problem and because computer technology is changing so rapidly.

Computer crime expert Donn Parker of SRI International, Inc. in Menlo Park, Calif., supported the 18-month amendment. Parker said he supports the bill because there needs to be some way "to alert [small business] management to problems and potential solutions; no other effective functions are in place to serve this purpose."

Computer industry support for the bill came from Comshare, Inc. Group Vice-President Donald Devine, who testified on behalf of the Association of Data Processing Service Organizations. He praised the bill's approach, saying "fostering education is the most important aid the government can provide."

Retailers Meet Set for Oct. 9-12

CHICAGO — The National Retail Merchants Association (NRMA) has announced that its 25th annual Retail Systems Technology and Communications Conference will be held at the Conrad Hilton Hotel here Oct. 9-12.

Carroll E. Ebert, chairman of Carson, Pirie, Scott & Co., will deliver the keynote address Oct. 9 on "A Retail Chief Executive's Perspective of Technological Opportunity."

About 50 working sessions will deal with all types of retail operations. A mini series will focus on the problems of automation for specialty chains.

More than 60 suppliers will demonstrate equipment, products and services. Full-conference fees are $369 for NRMA members and $599 for nonmembers; one-day fees are $185 for members and $300 for nonmembers. Further information may be obtained from John E. Chay, vice-president, NRMA, 100 W. 31st St., New York, N.Y. 10001.

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Congress Urged to Update Copyright Laws Soon

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Congress must move quickly but deliberately to update copyright laws if the U.S. is to gain the maximum benefits of information technology, a House Judiciary subcommittee was told recently.

"Forcing the new information technology into old copyright is a bonanza for lawyers and a blow to progess," Washington, D.C., consultant and futurist Joseph F. Coates said.

Coates, formerly assistant to the director and head of exploratory research of the Congressional Office of Technology Assessment, told the Judiciary Subcommittee on Courts, Civil Liberties and the Administration of Justice that "science is creating some truly new questions in terms of the legal categorization of things increasingly important to the economy . . . From a social point of view," he said, "access [to information] is central to the preservation and strength of democratic institutions."

In terms of software copyrights, Coates said, "There is now doubt in my mind that ownership rights should be attached to software." But "the role of software in various systems differs, and what the rules for protection should be is quite blurred. The need to clarify those points is enormous."

There is also great need for speed. "Actions should occur with some dispatch to stem the flow of court decisions which must force the future into historical arguments, categories and decisions which are obsolete. The courts have the potential for crippling the future. They are increasingly exercising that potential."

Duke University Law Prof. David Lange agreed that there is need for updating copyright laws. "The law of copyright has failed to respond adequately to the challenges posed from time to time by new technology," he said. But, he added, the issue is so important that changes must be made carefully.

He proposed a system in which the "burden of proof" for extending copyright protection to new areas be placed on those seeking the change. A good case for that extension could be made, he suggested, if the matter is "conceptually akin to the established subject matter of copyright, if it meets at least the established minimum requirements of originality" and if it is "reasonably analagous to the established 'writings' which are the province of statutory copyright."

Lange added, however, that "even when these threshold requirements have been met, the new interests ought to face a stiff challenge amounting to a heavy burden of proof and a clear presumption against [copyrightability]."

In general, Lange said, any new subject of copyright protection should have a clear definition and "common conceptual understanding" so that the dimensions of the resulting copyright are intelligible.

"An interest that cannot be defined and cannot be understood probably should not be made the subject of copyright protection," Lange said, adding "computer programs in Fortran or Basic, for example, probably meet this test; but programs in microchip reduction may not."

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Federal Systems Controls Found Inadequate

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A special task force investigating government computer fraud and abuse has reported that federal systems controls are so inadequate that half of all reported cases were discovered by accident.

A task force survey of 13 federal agencies and departments found 172 cases of computer-related fraud and abuse reported between Jan. 1, 1978 and March 31, 1982. But because the government has 16,000 computers, the task force concluded it had only identified a small number of these cases and said the true extent of the problem could not be gauged because agencies did not systematically track these cases.

Despite those constraints, the report said the picture that emerged of federal computer fraud and abuse was not unexpected: "The frauds are characterized by low-level employees in functional areas committing input types of frauds in government payments systems. The abusers usually involve higher paid, technically sophisticated employees using computer resources. Both types of acts are usually detected accidentally by insiders."

The survey was the first phase of the program undertaken by the task force, which is headed by Richard P. Kusserow, inspector general of the Department of Health and Human Services. The task force was formed by the President's Council on Integrity and Efficiency, which includes inspector generals and their equivalents from 20 federal agencies. The task force included computer auditing and security experts from several departments.

In its preliminary findings, the task force said the fraud cases, which carried losses up to $177,383, primarily (93%) involved theft of cash or diversion of other assets. More than three-fourths entailed a fictitious or unauthorized benefits claim or an unauthorized payroll payment.

Fictitious Beneficiaries

In one case cited in the report, a Social Security Administration claims technician created fictitious beneficiaries to obtain benefits payments for her coconspirators, netting at least $102,000 and perhaps as much as $500,000 before being arrested and convicted in 1980.

Computer abuse cases, with loss estimates up to $5,214, primarily involved theft of computer time (57%), theft of data (12%) and/or destruction or alteration of data (17%). Typical examples of this kind of case are those of a programmer running a football pool on his agency's system and an engineer using his agency's facilities to maintain the records of his after-hours customers.

The task force survey found that the majority of both fraud and abuse cases involved in-house facilities (80%) and occurred during normal processing (89%). The systems involved employed a variety of processing technologies: batch processing (48%); on-line, real-time processing (41%); on-line inquiry capabilities (33%); centralized processing (28%); remote batch processing (22%); and data base management systems (16%).

Describing the perpetrators, the task force said that while four out of five in the fraud cases had salaries of $20,000 or less, almost half the abuse perpetrators earned more than that amount. In both kinds of cases, approximately three-fourths of the perpetrators were nonsupervisory personnel.

Almost two-thirds of the fraud perpetrators were system users, but almost three-fifths of the abuse perpetrators were DP personnel. The report added that although three-fourths of the fraud perpetrators were subjects of judicial action of some sort, only about one in 10 abuse perpetrators were subjects of any judicial action.

The report called it "alarming" that half the cases were discovered by accident and concluded that better systems controls and training for auditors and investigators are necessary.

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Private Sector Seen Key to Information Economy

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The rise of the information age, spurred largely by computer and telecommunications technologies, necessitates greater reliance on private-sector initiatives and less government influence in society, a congressional committee was told late last month.

"The information economy will offer many opportunities if we are patient enough to let it flourish," Irving Leveson, director of economic studies at the Hudson Institute in New York, told a Joint Economic Committee hearing on industrial policy. Leveson was joined at the hearing by John Naisbitt, chairman of the Naisbitt Group in Washington, D.C., in urging that government not interfere with the development of the information-based services economy now emerging in this country.

Naisbitt, whose very successful book *Megatrends* identifies the shift from an industrial to an information society as a key trend of modern America, said that "in the new economy, there is a shift from institutional help to self-help. After World War II, in the '50s, we sort of turned our souls over to the corporations, our health to the medical establishment, our children to the schools and our welfare to the government. We are now in the process of reclaiming all of these as we move back to an old-fashioned self-reliance."

Similarly, Leveson said the new economy requires far more decentralized decision making than the economic system of most of the post-war period. "This decentralization is necessary so that economic actors" can respond to rapid changes, take advantage of decentralized technologies and "operate when a regulatory system no longer provides the nice neat boundaries that were designed for another era," he said.

"The flexible environment of an information economy calls not only for reduced structural regulation," he said, "but also for greater privatization. The private sector, while not always quick on its feet, has shown itself far better than the public sector in responding to new conditions, in placing emphasis on efficiency without politicization and in keeping up with new technologies."

A prime example of the need to restrict government influence, Leveson said, is in the current debate over the efficiency of government research and development. "Public and publicly funded R&D has been too slow to reallocate resources, to take advantage of new technologies or to deal with new problems," he said. "If government R&D converts innovators into bureaucrats, it will have done a great disservice to the industrial progess of this nation."

The Joint Economic Committee is holding a series of hearings on new technologies and the possible need for a national industrial policy. Chairing last month's hearing, Rep. Chalmers P. Wylie (R-Ohio) expressed a fear that established, smokestack industries and their employees might be left behind in the rush to an information-based service economy.

Leveson said it is not true the new technologies will destroy more jobs than they create or that they will create "a permanent underclass that is unable to cope" with the changing economy. He added that "it is essential that we not tax service industries . . . in order to support activities of the goods-producing sector."

He suggested government will have to play an important role in such areas as education and retraining. In addition, the private sector must also be encouraged to take on additional responsibilities, he said.

"But," he concluded, "it is essential that we allow full reign for the dynamic sector to create new jobs, raise income and develop opportunities to bring displaced workers into the mainstream of economic life, rather than to once again [create] an artificial class of dependent citizens through government programs which reduce self-help and individual initiative."

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OA managers and office workers are encouraged to tell us about their experiences in this area. Please send a brief explanation (one or two typewritten pages) of your views on this subject by Aug. 22. Submissions should be addressed to Glenn Rifkin, staff writer, *Computerworld OA*, Box 880, 375 Cochitutate Road, Framingham, Mass. 01701.

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1. *Datapro:* "User Ratings of Proprietary Software-COMPLETE" November 1982. 2. *Computerworld:* December 20, 1982.

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Network for Realtors Going On-Line Today

By Patricia Keefe
CW Staff

PALM BEACH GARDENS, Fla. — A telecommunications-based, problem-solving network, slated to go on-line today, Aug. 1, is expected to address a dramatic change in the real estate business — a move toward "counseling" to solve the problems associated with the sale of property.

The result of five months of intensive planning, the Exchange Network is structured to meet the needs of licensed realtors nationwide who often look for alternatives to cash sales — swapping properties, for example, or swapping mortgage notes for property.

Realtors today are no longer just brokers, they are problem consultants, according to Charles Huggins, the real estate entrepreneur behind Exchange Network, Inc., based here. With his network — made up of portable microcomputers linked to the 50-plus city telecommunications network of Compuserve, Inc. — realtors will be able to offer their clients options that could include a multiparty bartering of real estate, mortgage notes and other real properties (see box).

Realtors will be willing to share their ideas and experience through the network because "they understand that it is easier to close a transaction with someone who is informed than with someone who lacks the information and knowledge necessary to understand the transaction," Huggins said. Other benefits to the users include reduced postage and telephone costs in addition to access to marketing ideas.

The Network Exchange is unlike the National Association of Realtors' Real Estate Information Network, which functions primarily as a national multiple listing service for certain classes of property.

While subscribers to the Exchange Network are not required to be computer-literate, Huggins warns "many of the benefits of the network's services and software will be lost if you are not computer knowledgeable." However, subscribers who purchase their computer through the network receive two days of training.

The Exchange Network is offering Access Matrix Corp.'s Access computer, which comes with an Epson printer. Huggins is trying to standardize the equipment used "because it permits us to offer training and software."

The charter membership fee of $5,960 is not cheap, but Huggins claimed the fees are in line with the commissions that brokers are making on sales today. The charge covers a $4,000 initiation fee and $1,960 for the portable Access computer with application software (it retails for $2,495), plus financial analysis software and the training seminar.

However, subscribers can also pay only the $4,000 initiation fee and use a Digital Research, Inc. CP/M-compatible computer of their choice. For a "small charge," Exchange Network will configure its software to fit a particular computer. Also, subscribers have the option of choosing a lease/purchase plan that requires the first and last month's payments down and $212.49/mo for a total of 36 months. Subscribers are also charged for connect time at 50 cents per minute in addition to any designated surcharge on the menu.

Exchange Net Lists Services

PALM BEACH GARDENS, Fla. — The Exchange Network provides the following services:

- Property listings. For each piece of property, the data covers property characteristics, owner's profile and motivation and the lister's profile. The client's motivation is listed to give realtors "more creative ways" to make a transaction.
- Electronic mail and an electronic bulletin board. This handles information requests; correspondence; advertising; a Have/Want section, where realtors can advertise cash, paper or property for paper; transactions including filings, contracts and transfer notices; and a variety of meetings.
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- Conferences. Subscribers will be able to "sit-in" on the various seminars and workshops that Huggins hopes to run on-line.

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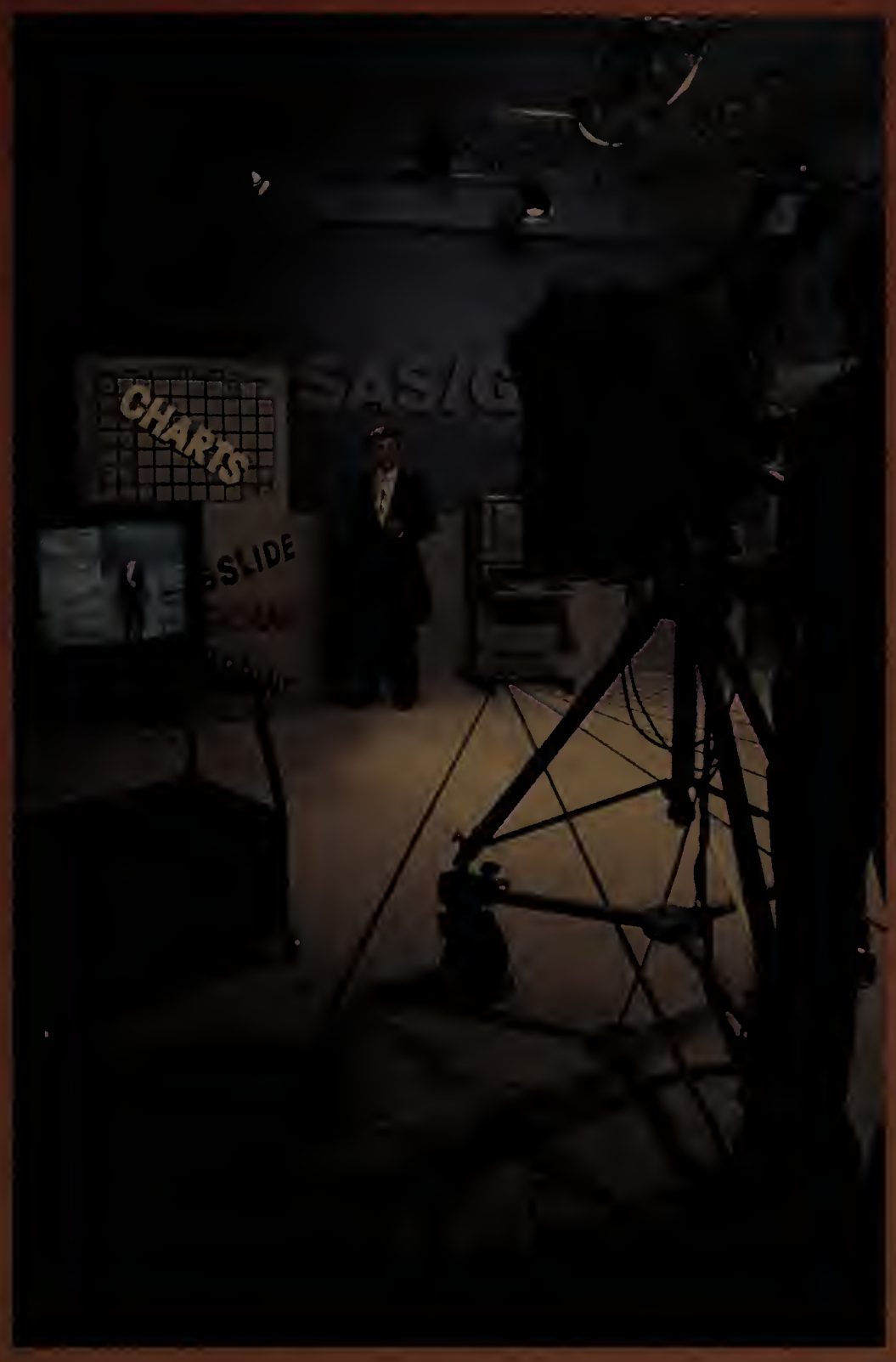

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Week of August 28

Aug. 29-Sept. 1, Toronto — **Capacity Management Forum**. Contact: The Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Aug. 30-Sept. 1, New York — **Advanced DBase II**. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

Aug. 30-Sept. 2, New York — **Data Communications: Components, Systems and Networks**. Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Aug. 31, New York — **Advanced Lotus 1-2-3**. Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

Aug. 31-Sept. 1, New York — **Workshop for Sales Managers**. Contact: The Association of Data Processing Service Organizations, Inc. (Adapso), 1300 N. 17th St., Arlington, Va. 22209.

Aug. 31-Sept. 2, Cary, N.C. — **SAS Basics Course**. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Sept. 1-2, Williamsburg, Va. — **Applying the New Tools for Profit and Cash Flow Planning: Graphics and Personal Computers**. Contact: Matthew Malok, The American Institute of Certified Public Accountants, 1211 Ave. of the Americas, New York, N.Y. 10036. Also being held Sept. 12-13 in Denver.

Week of September 4

Sept. 6-9, San Francisco — **IMS/DB (DL/1) Application Programming**. Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Sept. 6-9, Houston — **Vsam: Its Structure and How to Use It**. Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Sept. 7-9, New York — **Structured Testing**. Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 7-9, New York — **Micro and Home Computers: Technology and Application**. Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 7-9, Madison, Wis. — **Surge Protection of Computer and Other Electronic Systems**. Contact: University of Wisconsin Extension, 432 N. Lake St., Madison, Wis. 53706.

Sept. 8-9, New York — **Managing Software Projects**. Contact: Education Foundation/Data Processing Management Association (EFDPMA) Seminars, 3420 Kashiwa St., Box 3608, Torrance, Calif. 90505. Also being held Sept. 29-30 in Dallas.

Sept. 8-9, Oakbrook, Ill. — **Security Management Forum**. Contact: The Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Sept. 7-9, Atlanta — **Component Three: Managing the Human Aspects of Technological Change**. Contact: Rita Lounderback, O.D. Resources, Inc., 2900 Chamblee-Tucker Road, Building 16, Atlanta, Ga. 30341.

Sept. 8-11, Phoenix — **The Third Annual Sunbelt Computer Expo**. Contact: Judco Computer Expos, Inc., Suite 201, 2629 N. Scottsdale Road, Scottsdale, Ariz. 85257.

Week of September 11

Sept. 11, Monterey, Calif. — **Multifunction Workstations**. Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115. Also being given Sept. 12 and Sept. 13.

Sept. 11-13, Atlanta — **Life Office Management Associations (Loma) 60th Annual Conference**. Contact: Loma, 100 Colony Square, Atlanta, Ga. 30361.

Sept. 11-14, Lincolnshire, Ill. — **American Data Services Users' Seminar**. Contact: Sharon Spencer, American Data Services, Suite 210, 900 North Shore Drive, Lake Bluff, Ill. 60044.

Sept. 12-13, New York — **Introduction to the Unix System**. Contact: Structured Methods, Inc., 7 W. 18 St., New York, N.Y. 10011.

Sept. 12-13, Los Angeles — **Effective Communication Skills for Data Processing Professionals**. Contact: Registrar, Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 12-13, Los Angeles — **CICS/VS Performance and Tuning**. Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Sept. 12-14, Washington, D.C. — **Shared Networks: Automatic Transfer Money/Electronic Funds Transfer**. Contact: Executive Enterprises, Inc., 33 W. 60th Street, New York, N.Y. 10023.

Sept. 12-14, Minneapolis — **Office Automation: Concepts, Systems and Implementation**. Contact: Registrar, Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 12-14, San Francisco — **Computer Performance Measurement and Capacity Planning: Tools and Techniques**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 12-14, Washington, D.C. — **Hands-On Pascal Workshop**. Contact: Ruth Dordick, Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405. Also being held Sept. 26-28 in San Diego.

Sept. 12-14, Washington, D.C. — **Telecommunications Management: Cost Reduction Techniques**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 12-14, Clinton, Md. — **Programming in Basic**. Contact: Phyllis W. Parrish, Center for Management Development, College of Business and Management, University of Maryland, College Park, Md. 20742.

Sept. 12-14, Chicago — **Structured Testing: Tools and Techniques**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 12-14, New York — **The Personal Computer: Strategies for Managing**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 12-14, Washington, D.C. — **Word Processing Systems: Planning, Design and Operation**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Sept. 12-14, Boston — **Data Base Concepts**. Contact: QED Information Sciences, Inc., QED Plaza, P.O. Box 181, Wellesley, Mass. 02181.

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EDITORIAL

Nip It in the Bud

Fire fighting is not the way to prevent getting burned. Preventing fires is. And the way to prevent fires in a DP shop is for senior management to take a broad view of DP's role in the corporation and to work with a plan.

A recent study by researchers at the University of Michigan's Graduate School of Business Administration [CW, July 15] advises against the folly of dealing with minor emergencies as they occur without examining their underlying causes.

Continual system outages, reworking of applications, frequent hardware replacement needs, work backlogs, frequent errors, a growing DP budget, high turnover and overreliance on consultants and service bureaus should all be a red flag to senior management that something isn't right in the DP shop.

To head off such problems before they occur, senior management should communicate its attitude toward computer usage in the firm over time; define the responsibilities of those closest to the computing function; make a concerted effort to assimilate the DP group into the rest of the organization; and guarantee DPers' career paths.

Without such planning, the DP function will flounder around trying to find its niche in the corporation, DPers themselves will flounder around trying to find their niches in the DP shop, and the company itself may end up foundering on the shores of neglect.

What's the Encore?

If it is management experience and depth that choreograph success in a high-tech start-up, then Encore Computer Corp. should dance happily into the future. After all, Kenneth Fisher and Henry Burkhardt have pulled together the strongest start-up team in memory, having successfully raided their former employers' stable for top corporate, marketing and technical talent.

With their bold moves, Fisher and Co. were also highly successful at generating plenty of press fanfare, gaining the kind of exposure that other firms get only by mounting expensive ad campaigns — even though at a recent press conference very little was said about future plans.

But with the fanfare now a barely audible memory, what will Encore do for *its* encore?

For one thing, the company is going to need a large infusion of money at some point, if it is to realize its ambitious goals. The idea of shepherding 10 or more small companies through the treacherous and competitive maze that characterizes the computer market is both novel and intriguing. It is also quite risky.

Encore is starting out with about $1 million, raised from its initial employees. While this represents a significant vote of confidence from company founders, it is obviously not the stuff with which important acquisitions are made. With all the promising high-tech investments wanting for seed money, Encore will have to do some moving and shaking to get to the front of the line.

From all indications, the companies Encore envelope will not necessarily be of the same product ilk. Thus the question, "How thin can Encore spread its experienced managers when directing diversely aimed companies?"

But entrepreneurs have enjoyed raging successes in the past, starting out with a lot less than what Encore has. Fisher's and Burkhardt's plan strives to combine the stronger features of a venture capital firm, a holding company and a diversified corporation into a cohesive unit.

Now that the fanfare has subsided, it will be interesting to see what the curtain calls bring.

'Hold It, Wayne. It's Judge Harold Greene on the Phone.'

LETTERS

Don't Need a Crystal Ball

Rerun on the front page in four colors *Computerworld*'s editorial "Diploma Not a Free Ticket" [CW, July 11], regarding the future of programmers. That way, maybe the data processing professional will see it. It has been my experience that many professionals have no idea what the future holds in store for them.

Just skimming the rest of that issue shows evidence of the lack of knowledge. "Study Predicts Growing Usage of Info Centers" [CW, July 11] indicates that over half of the analysts and programmers surveyed are skeptical and pessimistic about end-user programming, while two-thirds to three-quarters of the people who count (our customers) are solidly behind it.

We don't need a crystal ball to see what's happening.

Thomas J. Francl
TIF Associates
Arcadia, Calif.

Surveying Surveys

The article "HP Customer Service Ranks High: Study" [CW, July 4], in which findings from an International Data Corp. (IDC) study on "User Satisfaction With Customer Service" are reported, contains some unfavorable statements on Wang Laboratories, Inc.'s service response times. In that the IDC survey includes a sample of only 14 Wang users, one of whom is located in a remote site in Hawaii, the validity of these statements is very questionable.

This user stated that he received a 48-hour response time under emergency conditions and a 96-hour response time under normal conditions. (This same user also reported satisfaction with these response times.)

By removing this one customer from consideration, the average response time in both emergency and normal conditions reported by the Wang users drops by approximately one-third.

In a sample of only 14 users, this one lopsided response heavily skewed the results because IDC used an arithmetic mean to compare the results for the various vendors. Wang's average response time in both emergency and normal conditions for the 14 users is four hours when the median, a much more accurate measure in this case, is used.

Ronald A. Munden
Vice-President
Marketing Services
Business Planning
Wang Laboratories, Inc.
Lowell, Mass.

A Case for Unions

I must respond to *Computerworld*'s editorial "Not Looking for Union Label" [CW, July 18]. I just turned in my hours for last week's work, and I had another 50-hour week; I've never worked a 40-hour week for my company. The firm for which I previously worked had a similar policy — programmer/analysts worked overtime with no compensation or they were forced to quit.

Computerworld refers to work alternatives like flex time; our time flexes only one way and that is in the company's favor. If we are late even by one minute, we are on report. We never get to leave at our proper quitting time of 4:30 p.m.

I would jump at the opportunity to join a union. I wish only that I have the chance.

Why doesn't *Computerworld* wake up and see us lowly programmers at the bottom of the ladder. How about writing about our side?

Name Withheld by Request
Chicago, Ill.

SOFTLINE/Werner L. Frank‡

The Perils of Computer Literacy

The widespread impact of data processing together with the proliferation of the personal computer has now made it imperative for everyone to become computer educated. Popular TV advertising, employing the influence of well-known personalities, suggests the importance of understanding this new technology. Adults are intimidated to participate if only because of the spreading interest and involvement of the younger generation, growing up in a world of video games and low-cost computers. Schools at all levels are introducing appropriate courses that teach entry-level computer skills.

Today's society cannot escape the touch of the computer in everyday life. As a result, computer literacy has become an identified goal for many. Entrepreneurs are responding with a number of offerings to spread the word about computers, employing such facilities as learning centers, special computer-oriented summer camps and computer-assisted training courseware.

Many writers have suddenly seen the benefit of picking up on the subject of the computer and becoming spokesmen on its behalf. In fact, one would be hard pressed to select a current magazine that does not contain at least one article related to the wonders of automation, whether it be for the office, the factory or the home.

While serious efforts abound in providing educationally sound seminars, classes and publications for the promotion of computer literacy and awareness, nevertheless, a topic so popular is vulnerable to the uninitiated. It is too easy to oversimplify and misrepresent. The greater public can, therefore, be easily misled and may thereby suffer the consequences.

In pursuit of this point, I have been reviewing the popular press in order to evaluate the information made available to the general public about computers. A case in point is the staff writer of *The Washington Post* who recently offered his advice to the wary consumer who may be considering purchasing a computer. The article seeks to alert the purchaser to information that would assist in making a wise computer buying choice. The theme of the article is to make "every bit count."

Bit Count

The article builds a case to support the notion that the bit count is the key element entering into the economic decision making when selecting a computer. It is alleged by the author that this parameter governs matters such as computer capacity, speed and accuracy of the device.

First the statement is made that "the latest innovative rage to hit the market is the 16-bit computer." Hogwash! The author obviously is not aware of all the 16-, 32- and 48-bit, even 64-bit computers, that have been around for a long time. Yes, the micro may now have the technology of 16 bits, but performance is a complex subject that even this simple bit (excuse the pun) of information does not sufficiently convey.

Unfortunately, the article's author is unaware and oblivious of the significance of word size, memory access logic and bus transfer capacity as important components entering into the performance equation. He is also innocent about the contribution of the CPU's clock rates, which further confuses and complicates the issue of performance. Indeed, aren't there certain 8-bit-based personal computers outperforming some of those 16-bit offerings?

The next bit of misinformation is the statement that "a single unit of 8 bits gives you 2^{16} combinations." Would the author understand the situation if we revealed that only 2^8 combinations can be extracted from 8 bits? He obviously has been misled by the peripheral information that the 8-bit computer usually can handle 64K bytes of memory (which requires a 2^{16} representation).

Having made this much of a mess already, I suppose that the next statement maintains the consistency of the misunderstanding: "Each grouping of bits is called a byte. An 8-bit computer means that any byte contains 8 bits. A 16-bit computer has 16 bits per byte."

Using this information, the author now asserts a true statement: "An 8-bit computer that is billed as having 64K bytes is one that has just over 64,000 bytes of 8 bits each." The reader is then entitled to reach the following incorrect observation: "A 16-bit computer that is billed as having 128K memory is one that has just over 128,000 bytes of 16 bits each," or twice the capacity that it really has.

The overall conclusion reached by this "expert" on the relevance of bit size for personal computers is that you can easily get by with an 8-bit machine if you are not an engineer requiring "superaccuracy" and you are not "considering tying together four or more personal computers" — hardly worthwhile advice for those wishing to exploit software such as Context Management Systems, Inc.'s MBA or Lotus Systems' 1-2-3.

But the writer is not content to leave the technical subject matter behind and dwell on more important user-oriented considerations. Rather, he goes on to explain the wonders of memory extended by storage. He states that as the memory is used up, the system can "trick" the computer into storing information on disk or tape systems. This facility is called "virtual" memory by the author, as opposed to the real memory. A little bit of knowledge and jargon can get one into serious trouble.

There you have it — an example of popular reporting. But what is really surprising is that the article was run in the newspaper's special section on computers. Surely, the press would want to be more careful about a subject that is becoming more and more important in the lives of every person today.

The above review is just one instance of poor reporting. Now let us look at another presentation, this time in one of the well-read airline magazines. Again, the topic is the issue of the 8-bit vs. the 16-bit computer and the relative benefits to be attained from one as opposed to the other. Here the argument is a bit more sophisticated and subtle. It is asserted that:

1. The largest number that can be represented by 8 bits is 255.

2. The largest number that can be represented by 16 bits is 65,535.

The conclusion reached from these statements is that while the number of bits doubled from 8 to 16, the number that can be represented has squared. Therefore, the reader is led to the conclusion that applications can achieve enormous benefits from 16-bit-based computers, contrasted with their 8-bit brothers. In other words, the implicit suggestion is that there is an exponential improvement in going from 8 to 16 bits in terms of what the computers can effectively accomplish as well as perform.

Clearly, this is misleading. More memory is a welcome convenience and potential performance improver. However, there is no way to get a "squaring" effect when moving from 8 to 16 bits. The casual observer simply does not understand how memory size, bus transfer capacity and number and size of computer registers work together to produce the performance characteristics of a specific computer.

We can expect a lot more of such loose writing and incorrect presentations to the general public on a subject that is daily becoming a topic of mounting interest. There is a lot of educating to be done before the untrained observers of the scene can be relied upon to report accurately the technical aspects of the computer.

Frank is an independent consultant and president of the Werner Frank Computer Group located in Calabasas, Calif.

HUMAN CONNECTION/Jack Stone‡

Concern Mounting Over Data Controls For Credit Reporting Agencies

Perhaps you saw the back-page news release that told of a low-grade form of *War Games* — the indictment of a person for allegedly tapping into a consumer data base via a remote terminal, stealing credit card numbers, charging a ton of fancy electronic hardware to the accounts of unsuspecting card holders and shipping the booty to his personal drop points. A handful of the purloined numbers belonged to well-known public figures.

This is hardly the first time such an incident has been recorded; that such thievery is commonplace explains why the event was downplayed by the press.

One must be optimistic that credit reporting agencies spend the time and money necessary both to produce clean files and to protect their security. But from this latest spate of stories over the years on such operations, concerns about their effectiveness are legitimate. Having had one particularly wrenching experience with them, I, for one, am very skeptical about credit agency performance.

A few years back, I decided to apply for the "executive credit" service with my bank, a fancy name the bank uses for its system that automatically credits funds to a zero-balance account through the device of the overdraft check. Naturally, I submitted a personal financial statement as part of the credit review, which I didn't really mind because I was in good financial shape at the time, my monthly income more than covering my expenses and credit card payments.

Well, you can imagine the whack on the ego I suffered when I received a form letter from the bank, turning me down on the basis of a negative credit rating from some organization called "The Credit Bureau." I had no prior experience with this enterprise and did not expect that I was about to become the umpteenth victim of a firm that made its bucks by selling off personal financial data.

Naturally, I was put on indefinite hold when I phoned for an appointment. I controlled my temper when a representative said I'd have to come out to the Washington, D.C., "boonies" to obtain a copy of the credit report and a correlated evaluation. After an interminable drive and long stay in an entry queue, I obtained a look at what purported to be a record of my financial history.

It was a joke, but I wasn't laughing. There were a dozen line items on the sheet, and not one was without error. For example, there was a home improvement loan marked as overdue, whereas I had paid it off three years before. Two major credit charge accounts that I had opened two years earlier, and for which payments were overdue, were not mentioned at all.

The matter was easily resolved. All I had to do was write a detailed letter of explanation to the bureau formally to take issue with my record; send notes to each of my accounts-in-error, requesting them to write the bureau to get the facts straight; and wait for a letter from the bureau acknowledging that my credit was in order, which I then forwarded to my bank, after which my credit rating was changed to "acceptable."

These days I deal only on a cash basis. Perhaps you understand why.

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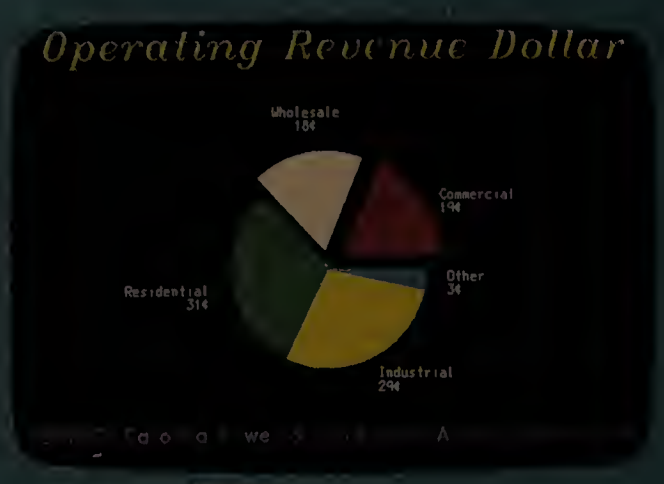
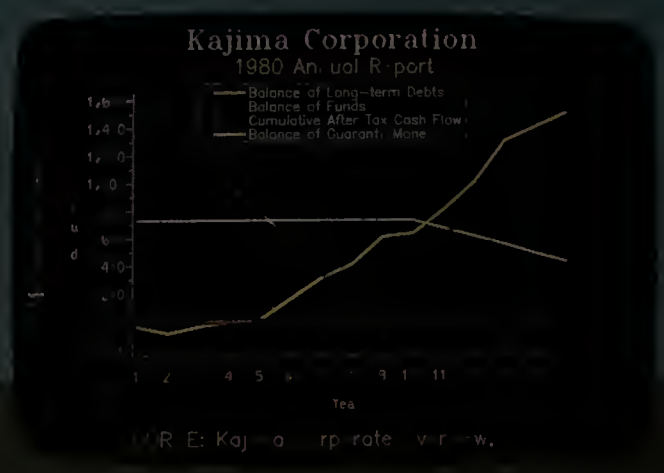
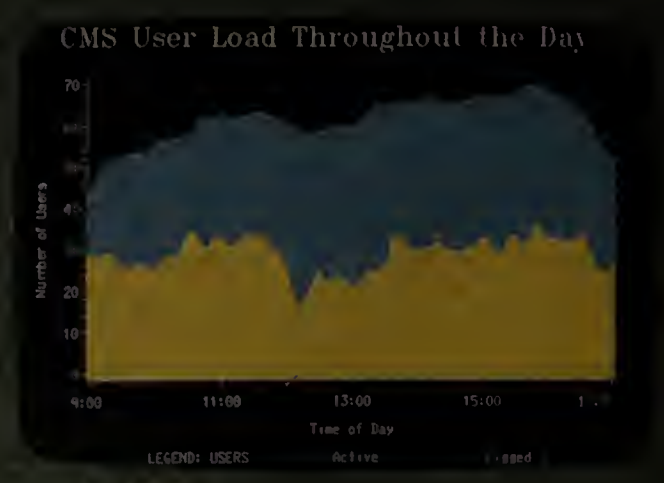


Pie Chart of Revenue



Plot of Funds*Year

Telephone Expenditures



Plot of Load*Time

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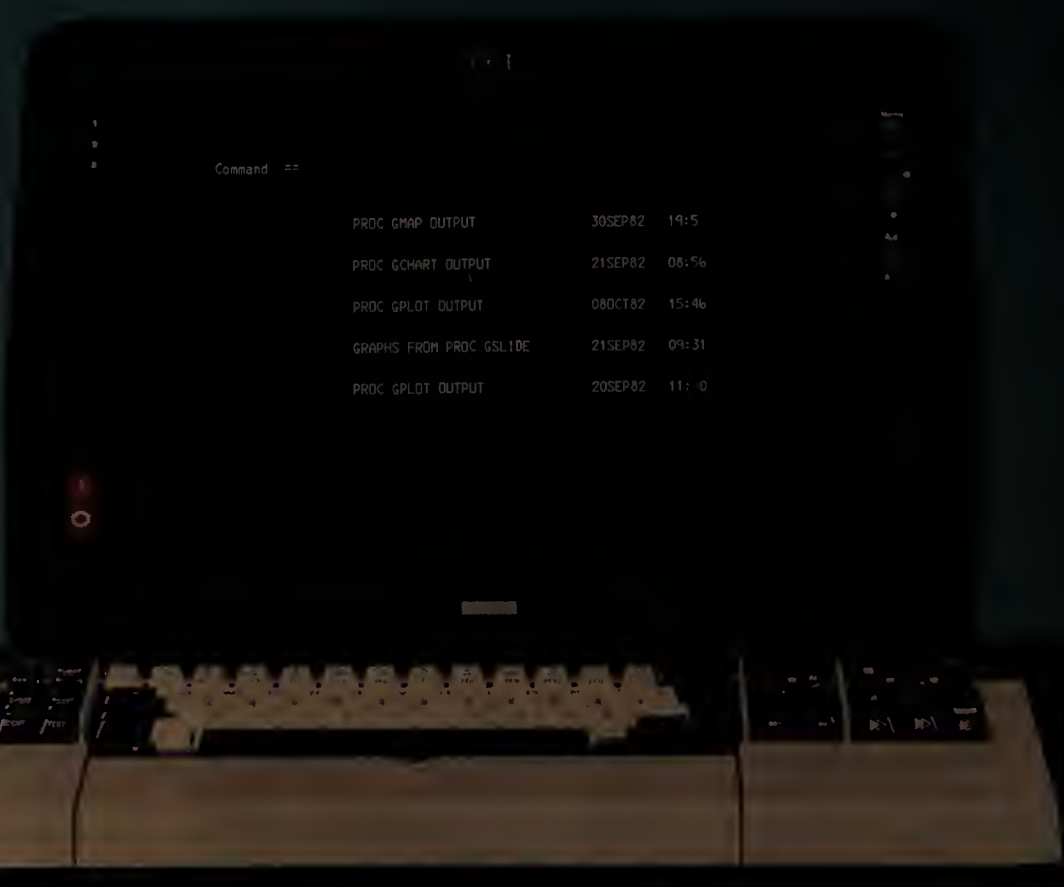

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'Stratagem' Version Designed to Speed User Response Time

BOSTON — Integrated Planning, Inc. has introduced a reentrant version of its Stratagem decision support system.

This feature is designed to improve user response time and the number of concurrent users that can be supported on the IBM 370, 4300, 30 series and compatible systems running under VM/CMS. The standard version of Stratagem continues to be available for IBM MVS/TSO-based systems.

Integrated Planning developed the reentrant version of Stratagem by converting its source code to the C language, which originally was developed by Bell Laboratories.

The reentrant version reportedly allows several users to share the same copy of Stratagem in memory instead of each user having an individual copy. Because 95% of Stratagem's critical subroutines are shared, working set overhead decreases, the vendor claimed. Less virtual memory is required for each user, and response time is improved for both Stratagem users and other DP jobs on the CPU. The reentrant version of Stratagem was designed to provide for more simultaneous users of the system without performance degradation.

The cost of a perpetual license for standard Stratagem is $75,000. The additional cost for the reentrancy option is $5,000. Integrated Planning is located at 338 Newbury St., Boston, Mass. 02115.

Firm Uses Spreadsheet Tool For Application Prototype

NORTH KINGSVILLE, Ohio — Although spreadsheet analysis tools have been successful mainly for business analysis, a manufacturer here has put this type of package to use in the unusual capacity of application prototyping.

In March, 1982, the one-man data processing department at Premix, Inc., a maker of fiberglass reinforced plastics, was immersed in converting the payroll system when the cost estimating department came in with an urgent request. Bernard Werner, manager of data processing, had to look outside for a solution.

He found it in "Paracalc," a spreadsheet package from Para Research, Inc. of Rockport, Mass., for the IBM System/34 computer. The DP manager spent a few hours becoming familiar with the package and then handed control over to Leo Wolker, a product cost engineer.

The initial model was written in steps using the various manufacturing processes as logical units of construction, Wolker said. The parts were rewritten and overhauled and put into production by mid-April.

The model consisted of three separate modules with the first 25 lines and two columns consisting of the input. The second section of the model was strictly for computation with each coordinate of the table labeled as to the calculation being performed. The third segment was the report itself, a segment that looked more like the output that might be expected on a spreadsheet, Wolker said.

There were drawbacks to the finished product, however. Although the model

(Continued on Page 34)

Also Enhances Dpex II, III

Nixdorf Offers Operating System

WALTHAM, Mass. — Nixdorf Computer Corp. has released a new operating system for its 8860 Distributed Information Processing System (Dipos). The company also announced two new versions of its Distributed Processing Executive Operating System, Dpex II and Dpex III, for its 600 Series Distributed Data Processing Systems.

Dipos 2.1 for the 8860 includes a job control system, full screen editor, printer spooling, enhanced Cobol compiler and runtime system and emulators for IBM 3270 Binary Synchronous Communications, 3770 Systems Network Architecture (SNA) and 3270 SNA/Synchronous Data Link Control terminals. Users can insert, edit and delete lines of text and perform global search and replace functions in full screen format. Dipos costs $1,600 for a perpetual license or $112/mo.

Dpex II and Dpex III feature improved data entry, data management and Editor programming language features of the older version of Dpex.

Other enhancements include file lock/unlock, enhanced management control, password protection for libraries, multiple identifications, library tools, user-defined communication port assignment, batchless edit and output and support for multiple I/O devices.

A conversion program for current customers is offered. A perpetual license for Dpex II costs $3,500 or $70/mo. A perpetual license for Dpex III costs $7,500 or $150/mo. All products are available from Nixdorf at 300 Third Ave., Waltham, Mass. 02154. .

'Dynacalc' Spreadsheet Upgraded

CHICAGO — Chicago Soft Ltd. has announced a new release of Dynacalc, a TSO and VM/CMS electronic spreadsheet.

Release 2.2 has increased the number of cells per megabyte of main storage from 50,000 to 125,000, a spokesman said. Response time has been improved by 20%, and the product now includes support to read automatically data from an external file in formats different from Dynacalc's.

Other enhancements in the new release include:

- Ability to merge data from similar work sheets.
- Ability to refer to data stored in other work sheets.
- Improvements in format, content and capacity of Help facilities.
- Support for all IBM 3270 terminals.
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The product is priced at $5,200 with a 30-day free trial available from Suite 2, 738 N. LaSalle St., Chicago, Ill. 60610.

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Software Management Tool Out for VAX Users

PORTLAND, Ore. — Oregon Software has announced a software management system for programmers working on Digital Equipment Corp.'s VAX systems running under VMS and PDP-11 systems under the RSX-11M operating system.

Called Sourcetools, the system is designed to aid programmers in managing access to source files and to document the changes in source files over the development life cycle of a product. It provides an automatic management scheme for software projects, particularly those involving numerous source files, joint development by several programmers or the creation of cross-system software.

Sourcetools reportedly may be used with software developed in any computer language and with any standard text file.

The core of Sourcetools is a package called Sourcecon which controls the creation and modification of source files. Another program, Make, automatically keeps programs up to date as components are changed. Two other programs, Textcom and Sedit, function together to ease the task of maintaining parallel source files on different systems.

Priced at $3,600, Sourcetools is available from Oregon Software, 2340 S.W. Canyon Road, Portland, Ore. 97201.

Cambridge Systems Offers IBM VM Version of ACF2

LOS ALTOS HILLS, Calif. — Cambridge Systems Group has announced the availability of an IBM VM version of its Access Control Facility (ACF2) security package. ACF2 versions have previously been available for the IBM MVS and VS1 operating systems.

ACF2/VM provides the ability to control access to the computer system, to data residing on the system and to other user-defined system resources, continuing the protection-by-default philosophy built into the vendor's earlier systems.

The VM version uses the interuser communication vehicle interface between the VM control program and the ACF2 service machine; a minimum operating system level of VM SP1 is required. Controls include user logon and password verification; user links to mini disks; CMS file controls including create, erase, read, write, rename, copy and open; and controlled access to OS data sets.

ACF2 is licensed on a CPU basis and will be available for $24,000. Cambridge Systems Group is located at 24275 Elise, Los Altos Hills, Calif. 94022.

Control System Released For HP 3000

PALO ALTO, Calif. — Project Resources, Inc. has announced Operations Control System (OCS)/3000, an operations control system for the Hewlett-Packard Co. HP 3000 computer.

The product provides users with automated scheduling, automatic multiqueue job processing with full dependency control, report distribution management, job performance and resource utilization statistics, tape library management and cost allocation reporting, a spokesman said.

To use OCS/3000, the operations manager defines a 13-month rolling business/accounting calendar indicating holidays, fiscal dates and other events. Specifications are assigned to each job stream to indicate the day or cycle on which it is to be run as well as any dependencies or resource requirements that must be satisfied.

Production can be run automatically with OCS/3000 providing multiple job queues, control of job dependencies and the ability to restart abnormally terminated jobs.

The product prints daily, weekly and monthly run schedules and generates over 75 management and statistical reports. The product costs $20,000 for a first site license and $5,000 for each additional CPU from Project Resources at 560 San Antonio Road, Palo Alto, Calif. 94306.

Wang VS Users Get 'Cobest'

GLASTONBURY, Conn. — A Contractors Budget and Estimating System (Cobest) for the Wang Laboratories, Inc. VS computer has been developed by Modern Data Management, Inc.

Cobest is an on-line integrated system said to support such construction functions as estimating, job costing, payroll, general ledger, accounts payable and accounts receivable, the vendor said.

Features of the system include quantity and general estimating, detailed job costing, retainage, union reporting, integrated applications and on-line documentation, the vendor said.

The package starts at $20,000 from Modern Data Management located at 70 Oakwood Drive, Glastonbury, Conn. 06033.

Personal computers in the office — personal or computers?

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Personal Computers? Micros? Desktops? Call them what you will, they are all integral parts of your OA strategy. The personal computer phenomenon must be analyzed and tracked if it is to be used effectively. In the next OA Focus section of *Computerworld OA*, we'll examine how personal computers will affect new and experienced computer users, their work habits and staff requirements. We'll look at management strategies, user experiences and key product offerings. Users who have lived through the process will suggest methods to tie personal computers into a total organizational network or to keep them as personal data bases. And, we'll have an update on information centers.

In this issue, we'll also have an interview with author Alvin Toffler as well as articles on subjects such as information systems, measuring productivity, data base management systems and a productivity study on electronic mail.

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Tymshare System Provides Data On Capital Assets

CUPERTINO, Calif. — An asset management system designed to track, control, analyze and report on capital assets is now available from Tymshare, Inc. on either a time-sharing basis or for in-house use on IBM and plug-compatible VM/CMS-based systems.

The Mechanized Inventory Tracking System (Mits), according to the vendor, allows aggregation of all or specific groups of assets either for a single location or multiple locations. It reportedly delivers accurate, up-to-date information about the cost, location, use, life and value of assets; and it assists in inventory control, planning and budgeting.

The system can use most intelligent terminals or microcomputers for off-line data entry and editing, Tymshare said, and features include English language commands, custom-formatted screens and built-in error verification. Information can be loaded into Mits automatically through use of a bar code scanner.

In-house versions of Mits are priced starting at $50,000. Further information is available from Tymshare, at 20705 Valley Green Drive, Cupertino, Calif. 95014.

Status Monitor Runs on HP 3000

MOUNTAIN VIEW, Calif. — Computing Capabilities Corp. has announced Radar, a performance and status monitor for the Hewlett-Packard Co. HP 3000 computer that is designed to supervise any application created on HP's Vplus 3000 terminal and forms management software.

Radar does not require recompilation or changes to existing procedures, a spokesman said. Data is available on terminal and transaction usage as well as response-time statistics. Usage and performance statistics can be collected in HP's Image data base management system. Standard reports include transaction volume and response times by application, transaction and form. Radar also captures the number of calls as well as elapsed and CPU times of Vplus intrinsics, the company claimed.

Users may create their own reports using HP's Query facility. The data collected by Radar supports the reporting of performance and usage statistics for any combination of application, transaction, form, terminal or user.

Managers or operators can send messages to users of monitored applications, which are displayed without disturbing the Vplus screens in use, the spokesman said. When allowed by system management, a programmer may define one of the functions keys in a Vplus application to access the Radar debugging facility.

Radar is priced at $3,500 for the first CPU from Suite 122, 465-A Fairchild Drive, Mountain View, Calif. 94043.

Requires No CICS Modification

CICS/Dras Version Tracks Abends

LATHAM, N.Y. — Mechanical Technology, Inc. has released a version of its CICS/Dynamic Resource Allocation System (Dras) said to be able to track Abend processing in IBM CICS systems and to require no modifications to CICS.

The software operates on any CPU or operating system running IBM's CICS. Version 2.0 of CICS/Dras is used for dynamically allocating IBM CICS resources such as IBM DL/1 data bases, IBM Vsam files and tables external to an application program. The software reportedly lets a user running an application program determine what resources should be used based on an operator or terminal identification.

A query feature included in Version 2.0 of the package is said to assist in debugging new programs. The introductory price is $6,500 for both DOS and OS users from the firm at 968 Albany-Shaker Road, Latham, N.Y. 12110.

Insight Finance System Enhanced

WHITE PLAINS, N.Y. — Insight Software Systems, Inc. has announced Version 7.0 of the Insight financial modeling system for the IBM System/34 and System/38.

New features include job stream maintenance and job stream scheduling, which can be used to perform matrix routines, rebalance models or print a report in a single job. Also added is Auto-Relate, a facility to create the structure of a financial model by defining account relationships through masks. Additional enhancements include increased system security and an enhanced tree-view facility.

The package costs $12,000 for the System/34 and $17,000 for the System/38 from Insight at Suite 901, One N. Broadway, White Plains, N.Y. 10601.

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CW 0801

Firm Uses Spreadsheet Tool for Prototyping

(Continued from Page 31)
was substantial, there were several internal table lookups, and the logic was made more complex by the inability to have decision-making through conditional statements, Werner said. Calculations tended to consume too many machine resources, and their complexity required the user to remain at the terminal while performing them.

Drain on Computer

Written in RPG-II, Paracalc was a tremendous drain on the computer, Werner added. Response time ranged from six to 15 minutes. In addition, the amount of available disk space was rapidly being reduced. By July, over 8M bytes of the system were already in use for only 88 models.

However, what seemed a problem turned into an opportunity, Werner said. "Here was a program that had been user-specified and user-written, and it was operational," he said. "It had been decided to treat the spreadsheet cost estimating model as a prototype, and it would be rewritten in a production language."

The model provided detailed specifications for the specialized Cobol program that was written to perform the same task. The documentation within the model was used to translate the calculations. In the process of translation, the underlying structure of the cost estimate model became apparent, and a two-dimensional table was used to drive the program, further simplifying the logic. Cincom Systems, Inc.'s Total data base management system was used to simplify coding. It also provided a means to have a working copy of the model to safeguard the user, he noted.

"Since the program logic remains fairly static, only the reports need to be saved, cutting the storage requirements significantly. Space is preallocated for 1,000 estimates at 5.5M bytes. Using Paracalc, over 90M bytes would have been needed for the same 1,000 models. Response time is now down to 20 seconds," he said.

The spreadsheet system served as a prototype. "Although performance and storage would not have been factors on the personal computer, the rewrite of the cost estimating program would have been inevitable," Werner said. "The Cobol program handles more complex logic that would have been extremely awkward, if not impossible, using Paracalc."

The superior inputting, error checking and formatting capabilities actually make the Cobol program more user friendly than the spreadsheet, he noted. In fact, it requires fewer commands to execute, and the commands are more meaningful since they relate directly to cost estimating.

"The user has received a system which he has specified and initially programmed," Werner concluded. "The resulting production system is specialized to the user's needs, the specifications having come from the user's own program."

Werner said that using spreadsheets as prototyping tools can cut the application backlog by as much as one third. "Data processing can only come out ahead by improving on the original design and putting out a product in less time," he said.

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Fits Systems Unveils DBMS for System/34, 36

NEW YORK — Fits Systems, Inc. has introduced Data Base Administrator (DBA) 34/36, an IBM RPG-II-based data base management system for IBM System/34 and System/36 computers.

The product offers direct access to data and includes the capability to define recurring reports, including user-defined calculations, a spokesman said. Access paths can be maintained on-line as activity occurs at the end of terminal sessions, at the end of a job or queued for batch processing. Support programs included are data base maintenance, universal inquiry, RPG-II interface and report generator.

The package costs $4,300 from Fits Systems, Suite 1100, 32 Broadway, New York, N.Y. 10004.

Run on Sperry's 1100 Series

New Versions of 'Ices,' 'Strudl' Out

BLUE BELL, Pa. — Sperry Corp. has announced new versions of its Integrated Civil Engineering Systems (Ices) Basic System and the Ices Structural Design Language (Strudl) civil engineering applications software, using the Ascii character code. The programs are designed for Sperry's 1100/60, 1100/70, 1100/80 and 1100/90 computer families.

Ices consists of the Ices Basic System and standard subsystems, each of which performs tasks associated with a particular class of engineering problems, a spokesman said.

Three other Ices subsystems available in Fieldata code are Roads (for roadway layout analysis), Cogo (coordinate geometry) and Lease/Sepol (siopes and embankments).

The Strudl subsystem, which assists in structural design, also includes Table, a file storage subsystem for structural information. The Ices Basic System is a prerequisite for use of Strudl.

The Ices Basic System costs $110/mo. The Strudl system costs $1,100/mo. An extended support charge for running the programs on Sperry 1100/80 and 1100/90 systems is $28 for Ices Basic and $275 for Strudl.

Sperry's Computer Systems Division can be reached through Box 500, Blue Bell, Pa. 19424.

Ten Courses On CICS/VS Set for NYC

NEW YORK — Telecommunications Technology Corp. has announced 10 IBM CICS/VS courses to be held from August to October in the metropolitan New York area.

The courses are: CICS/VS Concepts and Facilities (Sept. 6); CICS/VS Command Level Programming (Sept. 12-16); CICS/VS Fundamentals of Command Level Programming (Aug. 29-Sept. 2); CICS/VS Application Design (Aug. 15-18 and Oct. 3-6); CICS/VS Command Level Debugging (Aug. 10-11); CICS/VS Recovery/Restart (Sept. 28-30); CICS/VS System Problem Debugging (Sept. 20-21); CICS/VS Audit and Controls (Oct. 17-19); CICS/VS/DL1 Interface Architecture (Aug. 31); and CICS/VS Management Overview (Sept. 19).

Each of the courses costs $150 per student per day. For every three persons registered for a course, a fourth person can attend free. More information is available from Telecommunications Technology at 548 Fifth Ave., New York, N.Y. 10036.

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Random Notes

Bakco's Accounting Package Introduced for HP 3000

ARLINGTON HEIGHTS, Ill. — Bakco Data, Inc. has introduced accounts receivable/cash management application software for the Hewlett-Packard Co. HP 3000 computer.

The package features a cash forecasting report, accounts receivable statements and credit checking by both credit limit and past-due status of each account.

The manager reportedly can also enter collection messages into the computer under the invoice or customer. The messages print on the aged-trial balance but not on the statements.

The software is said to utilize the capabilities of HP's data base management system under the MPE IV operating system.

The package costs $9,800, including full documentation and support, from Bakco Data, Suite 190, 85 W. Algonquin Road, Arlington Heights, Ill. 60005.

Trapix Processors Get 'Rtips' For High-Speed Applications

LOS GATOS, Calif. — TAU Corp. has announced a Real-Time Image Processing Software (Rtips) package for high-speed applications, designed for the Trapix 5500 series of image processors from Recognition Concepts, Inc. of Incline Village, Nev.

Rtips' functions include real-time digitization and frame freeze, frame-to-frame averaging and subtraction, spatial filtering, point processing and image arithmetic and logic. It also has utilities for image storage on and retrieval from mass storage devices.

Currently available for Digital Equipment Corp.'s RT-11, RSX-11M and VAX/VMS operating systems, the system comprises an image processing library and a utility library of modules.

Rtips costs $6,000 from Suite 101, 10 Jackson St., Los Gatos, Calif. 95030.

MCBA Announces Package For Inventory Management

MONTROSE, Calif. — Mini-Computer Business Applications, Inc. (MCBA) has announced an Inventory Management package written in Cobol II with Hewlett-Packard Co.'s Image data base management system for the HP 3000 running under the MPE-IV operating system.

The package reportedly provides for the storing of raw materials, subassemblies and finished goods as inventory file items, which can be noted as regularly stocked or assembled/purchased on order.

Interwarehouse transfers are provided for, as well as issues and receipts, the vendor said. The software automatically converts purchasing units of measure to stocking/selling units of measure.

A source code license costs $4,500 for the first computer from Mini-Computer Business Applications at 2441 Honolulu Ave., Montrose, Calif. 91020.

'Catsoft' Modeling Program Operative on VAX-11/780

ATLANTA — Catronix Corp. has announced that its Catsoft program for three-dimensional solids modeling is fully operative on Digital Equipment Corp.'s VAX-11/780 minicomputer.

The configuration for operation of Catsoft includes the 32-bit VAX with DEC's VMS operating system, its VT100 terminal and keyboard and Advanced Electronic Design, Inc.'s 512-color terminal.

Catsoft ranges in price from $30,000 to $50,000. More information is available from Catronix, Suite 039, 151 Sixth St. N.W., Atlanta, Ga. 30313.

Microdata's ALL Available On Reality Business System

IRVINE, Calif. — Microdata Corp. has announced the availability of its Application Language Liberator (ALL) fourth-generation language on the Microdata Reality Small Business Computer System.

ALL lets users create applications by responding to screen prompts, a spokesman said. A library of common subroutines is contained within the ALL executive and used by the generator to create the applications. Subroutines cover reading and writing files, data entry, displaying and printing data and processing of information.

ALL costs $10,500 on the Reality system plus a $25/mo usage and support fee from Microdata at 17481 Red Hill Ave., Irvine, Calif. 92714.

Deltak Offering Two Courses On IBM's Personal Computer

NAPERVILLE, Ill. — Deltak Microsystems, Inc. has introduced two computer-based training courses: "Teach Yourself [Visicorp's] Visicalc on the IBM [Personal Computer]," and "Teach Yourself Visicalc on the IBM [Personal Computer]: Extended Features."

Basic skills, functions and commands can be learned from the introductory course. The extended features version includes on-line instruction, tutorial assistance and practice exercises provided through two interactive education diskettes for use on the IBM Personal Computer. A third diskette offers six templates which can be used to produce finished reports.

Both series are available for an average purchase price of $65 to $100 each from Deltak's East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

Screen Generation Provided For Burroughs by 'IDS'

JACKSONVILLE, Fla. — Jacksonville Software Services, Inc. has announced its on-line Interactive Development System (IDS) for use with Burroughs Corp.'s Command and Edit software.

IDS reportedly provides screen generation and data base development through the use of Burroughs' TD 830 or MT 985 terminals.

IDS allows any video terminal user to create an interactive, on-line data base and program with which the operator may add records to the data base, a spokesman said. Added records may be called up instantly for change or deletion.

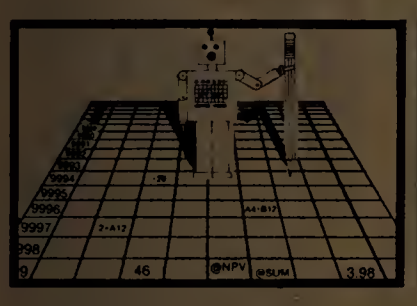
The product costs $4,950 from Suite 234, 7555 Beach Blvd., Jacksonville, Fla. 32216.

Self-Study Intro Course Targets RPG-III Users

WOODLAND HILLS, Calif. — Automated Training Systems, Inc. has announced a self-study, hands-on introduction to entry-level RPG-III, the primary language of the IBM System/38.

The computer-assisted course covers such subjects as the RPG-III program cycle, tables and arrays, files and data structures and physical and logical files. Course materials consist of audio cassettes, manuals and a diskette with sample programs and exercises.

The course costs $695 from the firm at 21250 Califa St., Woodland Hills, Calif. 91367.



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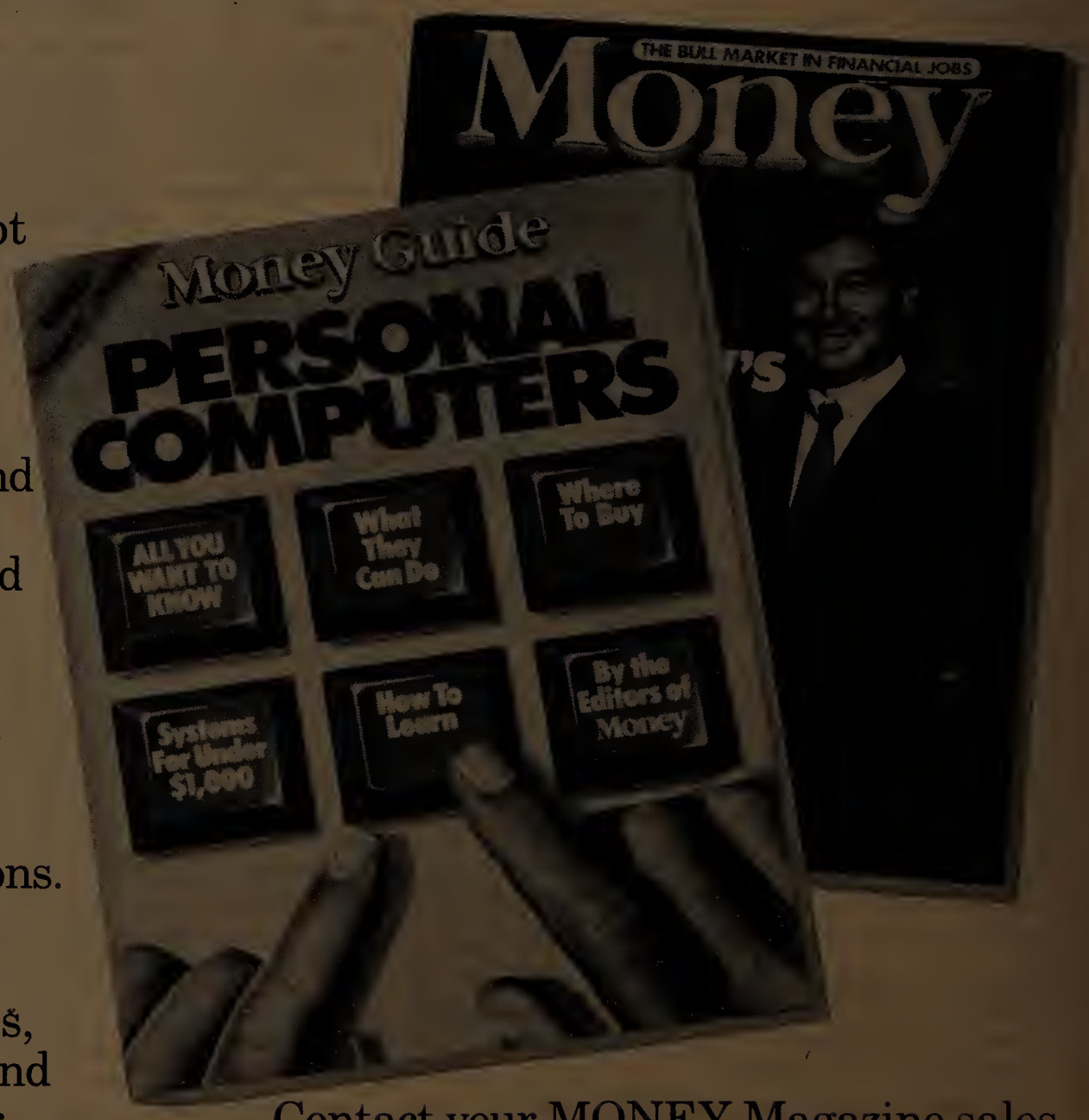

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DP Managers Get Set for AT&T Divestiture

By Bob Johnson
CW New York Bureau

NEW YORK — With the divestiture of AT&T's operating companies around the corner, data processing and telecommunications managers are scrambling to get their shops ready for the problems they expect to result.

Computerworld conducted a telephone survey of DP and communications professionals in the New York area last week to find out what is being done to head off this anticipated communications confusion. New York is the country's largest user area and a probable trouble spot, and managers here expressed concern over the control, cost and personnel in communications.

Personnel will play an important role in getting through the AT&T changes at the U.S. Trust Co. of New York, according to Michael Casale, the company's DP special projects manager. Casale said that he is currently working on a network control center for his bank's communications and DP operations. A major part of coordinating the center will be the help of savvy computer professionals.

'The AT&T breakup will no doubt just compound . . . problems, but we are at a stage now where we are attempting to head off these kinds of data communications disasters — Michael Casale, U.S. Trust Co.

"Our communications area has grown so fast that it's difficult to know just who has control," Casale said. "The AT&T breakup will no doubt just compound the problems, but we are at a stage now where we are attempting to head off these kinds of data communications disasters.

"Part of our communications' network control center will consist of a 'help desk' where a DP assistant will take calls from users with communications problems and direct the problem to a technician, probably the on-line master terminal operator," Casale maintained.

Michael Kanthal, assistant vice-president of telecommunications engineering and development for Citibank here,

(Continued on Page 40)

CESI Mux Runs On DEC PDP-8, CESI Omnipac

HOUSTON — Computer Extension Systems, Inc. (Cesi) has introduced an eight-line asynchronous multiplexer for Digital Equipment Corp.'s PDP-8 or Cesi Omnipac computers.

The SLZ8 Serial Interface is said to provide users with eight serial line controllers on one hex-height card. Similar in operation to DEC's KL8A, the unit reportedly uses only two device code addresses and provides a unique vector address for each channel.

The unit supports full-modem control on one line with limited modem control on seven lines. Delivery is immediate at $875 each from Cesi, 17511 El Camino Real, Houston, Texas 77058.

Fully Programmable Package

HP Unit Offers Vector Graphics

PALO ALTO, Calif. — Hewlett-Packard Co. has announced a display package said to provide high-speed vector graphics in a fully programmable, self-contained unit useful for process control and monitoring as well as measurement and analysis.

The 6-in. directed beam Model 1347A reportedly contains its own power supply, making it suitable for rack mounting or bench use in manufacturing and test environments.

The unit's CRT is said to produce real-time graphics with high addressable resolution as needed in waveform analysis, data acquisition and process control and monitoring.

The unit reportedly can scroll through data horizontally in both directions across the screen, according to a vendor spokesman.

The unit accepts both 8- and 16-bit binary commands as well as Ascii commands from a desktop or mainframe computer. The price is $5,100 from HP at 3000 Hanover St., Palo Alto, Calif. 94304.

Tymshare Adds to Scanset Line

CUPERTINO, Calif. — Tymshare, Inc. has introduced a 1,200 bit/sec model to its line of Scanset personal information terminals.

The Scanset Model 415/HS reportedly increases fourfold the speed at which the terminal can access or retrieve computer-stored information.

The 415/HS contains an internal Bell 212A-compatible modem that can be used at either 300 or 1,200 bit/sec. The unit also contains an automatic telephone dialer and automatic login, the vendor said.

Priced at $1,295, the terminal is available from Tymshare, 20705 Valley Green Drive, Cupertino, Calif. 95014.

Model 333 Coupler Provides Backup

WALDWICK, N.J. — STC Systems, Inc., a subsidiary of Storage Technology Corp., has introduced its Model 333 concentrator dial backup coupler said to provide users who have leased telephone lines with an alternate or backup to standard telephone line transfer of data via private line data channels.

When a leased telephone line is down, all that is reportedly required are two telephone calls for the system to run again via the new circuit.

Standard features of the unit include a set of transmit and receive test jacks; a LED to indicate when the unit is in the dial backup mode; and a switch to return it to its standby state, according to a vendor spokesman.

Priced at $1,570, the Model 333 coupler is available from STC Systems, Four North St., Waldwick, N.J. 07463.

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Redundancy Alone Won't Stop Net Failures, Report Says

CHERRY HILL, N.J. — High reliability components and redundancy alone will not protect network users from communications path failures, according to "Communications Test Equipment — A Solution to Increased Productivity," by Data Decisions, Inc.

Such measures, the report contends, may dramatically increase costs without providing sufficient improvement in uptime to justify the expense.

Instead, "a combination of proper testing and diagnostic procedures, coupled with selective sparing of equipment and well-executed maintenance agreements, are a better guarantee of network availability than redundance," the report said. Users are warned that they could easily spend their entire communications budgets on just a few pieces of test equipment.

The report (9-CK) costs $29 and explores the subject of network failures, offers equipment selection guidelines and points out key questions to ask when evaluating equipment for specific situations, the vendor said from 20 Brace Road, Cherry Hill, N.J. 08034.

Workstation Unveiled for X-Net

SANTA MONICA, Calif. — CR Computer Systems has introduced a multiprocessor-based workstation for use on its X-Net local- and wide-area data communications networks.

The Network Administrator reportedly provides network management for X-Net, which can link from 50 to 50,000 noncompatible mainframes, minicomputers, terminals and peripherals.

Special functions performed by the Network Administrator include performance statistics, password protection, electronic mail and code name control of all peripherals and attachments, according to a vendor spokesman.

Priced at $8,000, the Network Administrator is available from CR Computer Systems at 1255 Lincoln Blvd., Santa Monica, Calif. 90401.

Parallel Interface Offered

ANAHEIM, Calif. — Preston Scientific, Inc. has announced a high-speed parallel interface to the Gould, Inc. Gould/SEL superminicomputers.

The interface reportedly provides the required logic terminations and compatible driver-receiver circuitry for operating Preston's analog and digital conversion subsystems from the Gould/SEL HSD controller.

The interface is available with options for either a 16- or 32-bit format. A data packaging feature allows the converted data to be assembled into 32-bit words consisting of two 15-bit conversions and transferred to the computer at a correspondingly slower rate.

The interface is priced at $3,595. Preston is located at 805 E. Cerritos Ave., Anaheim, Calif. 92805.

DP Shops Readying for Divestiture

(Continued from Page 39)

told *Computerworld* that because his company is so decentralized, it is difficult to determine just what DPers or communications managers are doing in respect to AT&T. However, he has heard that some areas of the company plan to hire more people.

"Many communications areas at Citibank are beginning to look for more communications people for the technical side of operations," Kanthal said. "Managers' primary interests are getting personnel who can troubleshoot a circuit, for example, without having to rely on the vendor. This is obviously a reaction to their concern over the problems the AT&T breakup is going to have."

Citibank communications managers are looking for people in network design as well. Kanthal pointed out that designing a communications network is much more complex than it was, and it takes professionals who really know the ropes. "It involves a lot more than just laying out a [IBM] 3270 network the way it used to be. Technical people now have to be able to handle multidrop lines using AT&T's Long Lines.

Ease Coordination

"Also, the differences between 'intra-' and 'inter-' Local Access and Transport Areas [Lata] must be understood," Kanthal continued. "These communications people will have to know how to design a network for optimum cost effectiveness and now with AT&T's split, how to ease the vendor coordination effort."

The AT&T breakup is being closely looked at by the St. Regis Corp., according to its Manager of Corporate Telecommunications Services Tony Mattera. He said the company's senior management has requested that a specific telecommunications plan be submitted by mid-September outlining what procedures that communications and DP will take in the AT&T situation.

"Because of the predicted skyrocketing communications costs that will be caused by the divestiture, there are a few major areas that we will analyze before we make any definite moves," Mattera said.

"First we are hiring some outside consultants to help us determine just what kind of data traffic is being transmitted over our private communications lines. Then we'll see if it's justified. For example, we'll have to decide whether we need to have so much printer traffic transmitted or not," Mattera added.

Digital Networks

The communications professional added that his company will also look more closely at the possibility of using digital instead of analog networks. "My guess is that we'll be using more public network services," he concluded.

Another communications manager at U.S. Trust, James Lennon, who is responsible for facilitating network software, said that there is an intense effort going on between both the DP and teleprocessing areas to install and develop network software so that communication between the Trust Co.'s offices and other branch shops will be smooth.

"We are fine-tuning our multisystem network facilities software under Vtam's Version II," Lennon maintained.

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Allows Mips Migration

PE Releases 32-Bit Supermini

OCEANPORT, N.J. — Perkin-Elmer Corp. has unwrapped a 32-bit supermini-computer that enables users to migrate from a 3- to a 21-million instructions per second system.

Christened the 3250XP, the system, like its year-old predecessor, the 3200MPS, can support up to eight auxiliary processing units (APUs) that are linked together to act as a single processor.

But unlike the 3200MPS, the 3250XP allows system builders and application developers, that don't need the minimum two-processor configuration of the 3200MPS, the ability to purchase the single-processor 3250XP and add the auxiliary processors as needed.

Priced at $150,000, the 32-bit system's basic configuration is made up of a CPU that holds 2M bytes of memory in two separate banks, writable control store, universal clock, loader storage unit, two communications lines and a system console. The package also includes direct memory access, an I/O chassis, system cabinet, power supply and battery backup, the spokesman added.

Additional information on the system can be obtained from Perkin-Elmer at 2 Crescent Place, Oceanport, N.J. 07757.

Stand-Alone System Includes Array Processor Architecture

WAKEFIELD, Mass. — Analog Corp. has announced a stand-alone, general-purpose computer system that incorporates an array processing architecture that reportedly enables the system to execute up to 10 million floating point operations per second.

Called the APL Machine, the system is designed as a development tool for high-level decision making, according to the company. A typical configuration consists of a 4M-byte array processor; an IBM Personal Computer, that can be used as a programmer's workstation; a 124M-byte hard disk; and a dual-mode tape drive. The system also sports an I/O processor, supporting up to eight terminals, as well as the Analogic software system.

In addition, the system's array architecture is said to support several levels of overlapped and parallel processing, the vendor said.

The APL interpreter runs in the 12.5 MHz, 16/32-bit control processor and handles all aspects of syntax and conformance checking, the vendor added.

The APL Machine is priced from $40,000 to $80,000, depending on the configuration, from Analog, located at Audubon Road, Wakefield, Mass. 01880.

Workstation Can Be Linked To IBM CPUs

BILLERICA, Mass. — A new color raster workstation for attachment to IBM or compatible mainframes was recently announced by Adage, Inc.

An addition to its 4250 product line, Adage said up to four new workstations, designated DC/4250, are driven by a new raster graphics controller, GR/4250, which executes both the IBM 3250 graphics command set and a color raster set of extensions designed for compatibility with Cadam, Inc. software.

The workstation is packaged in a new console featuring a 19-in. display monitor with 1024 by 1024 pixel resolution, according to Adage, and a palette of 4,096 colors is available from which 16 can be selected for simultaneous display. It features a 20 MHz (50 n/sec.) pixel writing rate, according to the vendor.

Optional features include 1280 by 1024 pixel resolution, refresh buffer memory expansion up to 128K bytes, and 256 simultaneous colors.

Deliveries will begin in 150 days, and the price for a typical configuration is less than $43,000.

Adage is located at One Fortune Drive, Billerica, Mass. 01821.

Standard Bus Disk System Out

TUCSON, Ariz. — Applied Micro Technology, Inc. (AMT) has announced a standard bus disk subsystem that is said to offer up to 22M bytes of formatted data storage capacity.

The FD840/H series of Modular Disk Subsystem integrates two 8-in. half-height double-sided, double-density floppy drives and one 5¼-in. hard disk drive into a single package, the vendor said.

Housed in a 7-in.-high enclosure, the unit's basic configuration includes the standard bus interface, intelligent controller and AMT's ST9101 Software Support Package, which includes the standard Digital Research, Inc. CP/M operating system and three system utility programs — SET, FORMAT and REMAP, a spokesman said.

A rear-mounted, drive-select switch assembly reportedly permits easy designation of physical unit numbers for systems that utilize more than one subsystem.

The FD840/H package also includes power supply, cooling fan and all cables necessary for installation. Rackmount and tabletop versions are available.

Unit price of the FD840 (floppy system only) is $3,995. Unit prices for the FD840/H range from $5,995 for the 7.4M-byte system to $7,560 for the 22.4M-byte system. AMT can be reached through P.O. Box 3042, Tucson, Ariz. 85702.

Insurer Casting 1,000-Plus DPS 6/40 Net

NEW YORK — Metropolitan Life Insurance Co. here has begun installation of more than 1,000 of Honeywell, Inc.'s recently unveiled DPS 6/40 micro-based minicomputer systems — the largest Honeywell computer network ever installed for a commercial customer, according to the vendor.

The systems will be installed at Metropolitan Life's personal insurance sales offices throughout the U.S. and Canada. The multiyear requirements contract also includes user training, software development and equipment maintenance.

The computers, announced July 12, will be used in the insurance company's Sales Office Network of Intelligent Computers (Sonic) and are expected to be installed in district and branch sales offices during the next 18 months. The Sonic system will result in more efficient, cost-effective sales and administrative operations, according to Pierre Maurer, Metropolitan executive vice-president. "By decentralizing our computerized sales support activities, we will be able to provide faster, more comprehensive service to our policyholders," he said.

Honeywell was selected over two other vendors after extensive study and a one-year pilot program at 20 offices in Texas.

"The Honeywell systems were chosen on the basis of reliability, expansion capacity, maintenance support and ease of use," Maurer said.

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Based on Zilog's Z80A

Visual Technology Unveils Visual 1050 Micro

TEWKSBURY, Mass. — Visual Technology, Inc. has announced the Visual 1050 microcomputer, based on the Zilog, Inc. Z80A microprocessor.

The unit comes with a library of software including Micropro International Corp.'s Wordstar (Release 3.3) and Mailmerge (Release 3.3) packages and Digital Research, Inc.'s DR-Graph graphics package, GSX-80 graphics device driver and Cbasic programming language. The system also comes with Visual Technology software to allow the system to emulate a Digital Equipment Corp. VT100 terminal. The system comes with Digital Research's CP/M Plus operating system, the vendor said.

Visual 1050 hardware includes two 400K-byte disk drives, 96K bytes of random-access memory expandable to 160K bytes, a high-resolution 640 by 300 bit-mapped monochrome display, printer port, modem port, Winchester disk expansion port and detached 93-key keyboard. Options include a plug-in dual-port serial card, memory expansion hardware and a Winchester hard disk.

The Visual 1050, including software, costs $2,695, Visual Technology said from 540 Main St., Tewksbury, Mass. 01876.

Add-In Memories Debut For DEC's VAX-11/780

SANTA ANA, Calif. — The Standard Memories Division of Trendata Corp. has announced the Pincomm 780SX, a line of add-in memories for Digital Equipment Corp.'s VAX-11/780 processors.

The Pincomm 780SX memory modules provide 1M byte of memory on a single card using full 64K-byte random-access chips. The memory cards are hardware- and software-compatible with VAX-11/780 systems using the DEC MS780E memory system, the vendor said.

The add-in memory boards can be installed directly into the MS780E memory system without modification to DEC hardware or system cabling. Each memory data word stored by the Pincomm 780SX is 39 bits wide, consisting of 32 data bits (four 8-bit data bytes) plus seven error-correction check bits. The check bits allow for single-bit error correction and double- or multiple-bit error correction.

Each Pincomm 780SX board is offered with a four-year warranty and costs $2,800, the Standard Memories Division of Trendata said from 3400 W. Segerstrom Ave., Santa Ana, Calif. 92704.

Line Printers Compatible With IBMs

FORT LAUDERDALE, Fla. — Southern Systems, Inc. has announced a line of heavy-duty 1,500 and 2,000 line/min line printers that reportedly are compatible with most computer systems, including those made by IBM, Digital Equipment Corp. and Data General Corp.

The 2,000 line/min printer, the BP-2000, was designed as a replacement for the IBM 3211 printer. Both the BP-2000 and the 1,500 line/min unit, the BP-1500, are targeted at heavy-duty data processing environments.

The printers cost from $21,000, depending on quantity, computer type and other special applications needs of end users. Southern Systems is located at 2841 Cypress Creek Road, Fort Lauderdale, Fla. 33309.

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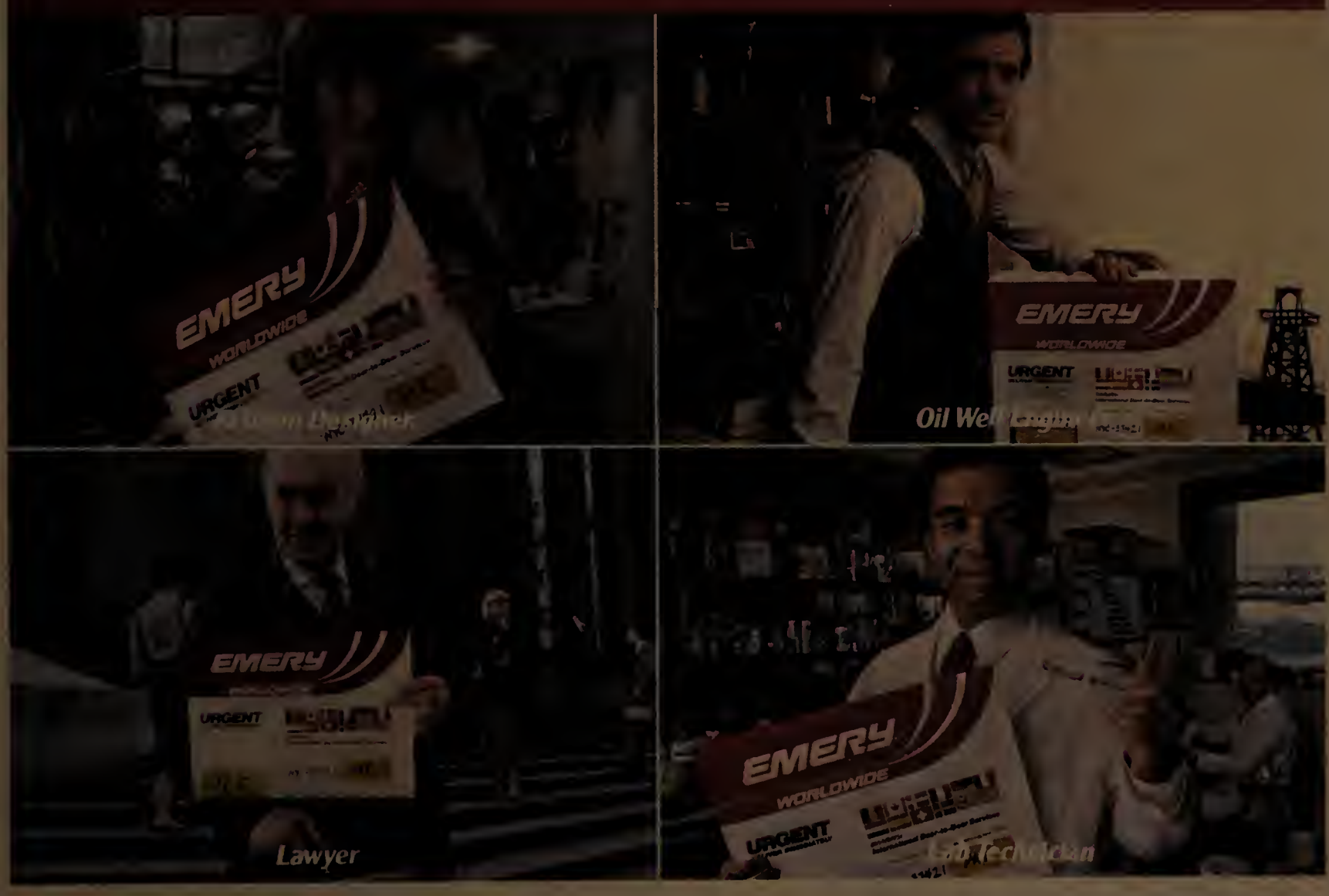

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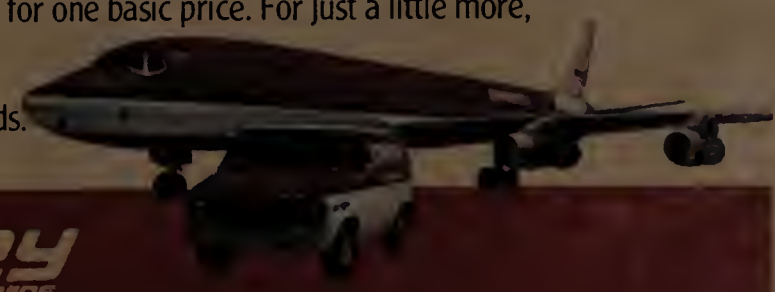

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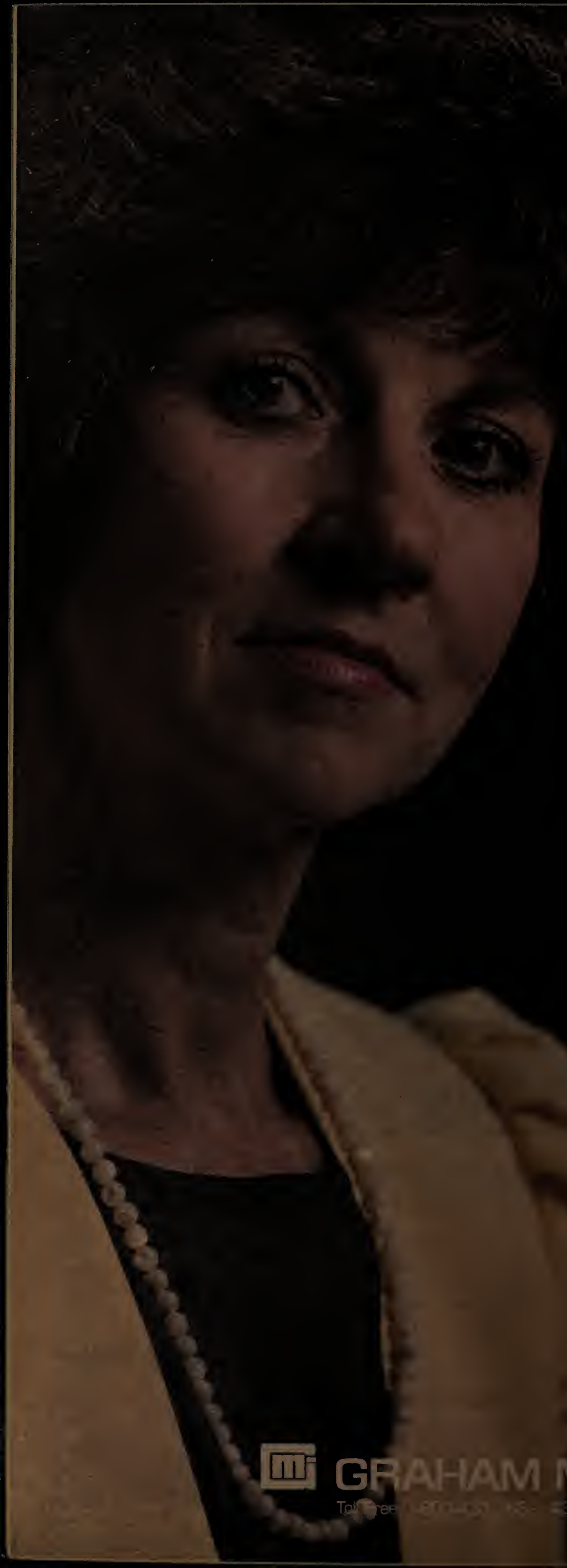

"We use Graham's Epoch 480 exclusively; quality-related problems are virtually zero."

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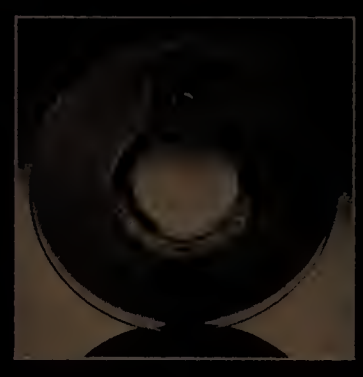

Talk to the Media Management Specialist at Graham Magnetics The tape company.

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Graphics Terminal Debuts for CAM/CAE

TOKYO — The Nippon Computer Co., Ltd. has announced the release of a graphics terminal designed for computer-aided manufacturing and engineering (CAM/CAE) applications. The terminal is said to be compatible with the Digital Equipment Corp. VT100 and the Tektronix, Inc. 4010/4014.

The NJC-C1922 Color Graphics Terminal comprises a detached keyboard and main unit, which contains a 19-in. color monitor, CRT controller, graphics processor and communications section. The terminal features 1,024- by 780-pixel resolution, 16-color display, advanced text editing and communications functions.

The NJC-C1922 costs $9,950 from Nippon, Naito Building, Nihonbashi Hamacho 2-25-1, Chou-ku, Tokyo 103, Japan.

With Color Graphics
Lexidata Unveils Display Processor

BOSTON — A color display processor said to offer fast, flicker-free 1,280- by 1,024-pixel, 60Hz, high-resolution, noninterlaced color graphics was announced recently by Lexidata Corp.

The Model 3700, latest addition to Lexidata's System 3000 family of compatible color display processors, writes in blocks of up to 80 pixels, according to the company, allowing for writing speeds of up to 42 million pixels per second. The automatic block writing feature results in almost instantaneous fills. Also, a continuous-speed vector write time of 750 μsec per pixel allows complex drawings to be displayed quickly, a spokesman noted.

Users can implement high-speed routines using a standard Writable Control Store programmability feature, Lexidata said. An Extended Graphics Operating System firmware package (Egos3) is plug-compatible with earlier 3400 Egos versions. Parallel Direct Memory Access interfaces are available for most host computers, according to the vendor.

Four 3700 systems are available from Lexidata: a 640- by 512-pixel, 60Hz version, two 1,280- by 1,024-pixel, 30Hz versions and a 1,280- by 1,024-pixel, 60Hz version. Prices start at $9,995. Further information is available from Lexidata, 755 Middlesex Tnpk., Billerica, Mass. 01865.

Magnetic Tape Controllers Fit DEC LSI-11, PDP-11

ORANGE, Calif. — MDB Systems, Inc. has announced a line of console-configurable magnetic tape controllers for Digital Equipment Corp.'s LSI-11 and PDP-11 systems. At the same time, the company also unveiled a smart disk controller for the LSI-11.

Designed to control any combination of modes and speeds on four drives simultaneously, the DEC TM-11-compatible controllers interface nonreturn-to-zero, phase-encoded and combined nonreturn-to-zero inverted/phase-encoded drives on a single board. The controllers are transparent to DEC operating system drivers and diagnostics; are 16-, 18- and 22-bit bus-compatible; and have automatic self-test on board, according to the company.

The Q-bus tape controller Model MLSI-TM11 is priced at $2,600; the Model MDB-TM-11 for Unibus is $2,950.

The MLSI-RM11 smart disk controller reportedly configures eight storage module drives to LSI-11 systems without reprogramming. Emulating DEC's RM01, RM03, RM05 and RK06/RK07 drives, the controller is driver- and diagnostic-transparent to all DEC operating systems and Unix and can be integrated without any modification. It maintains true media compatibility with DEC RM series drives and has a true Control Data Corp. Storage Module Drive interface, according to the vendor.

The MLSI-RM11 costs $2,800 from MDB Systems, located at 1995 N. Batavia St., Orange, Calif. 92665.

Emulator Announced

EL SEGUNDO, Calif. — Imperial Technology, Inc. has announced a solid-state nonrotating disk emulator system called the Megaram-7000, said to be a direct replacement for Digital Development Corp., Data Flux and Vermont Research rotating fixed-head disk drives.

The Megaram-7000 reportedly accommodates a variety of different drive formats and capacities and is both hardware- and software-equivalent to the drives it replaces. The system features 10M bytes in a 7-in. chassis expandable to 16M bytes, battery backup option, full error detection and correction, high reliability and ease of maintenance, the vendor said.

The storage system is contained in three subassemblies. The 2M-byte version of Megaram-7000 costs $16,600, according to a spokesman for the vendor. Additional information is available from Imperial Technology, located at 831 S. Douglas St., El Segundo, Calif. 90245.

NCS Offers Employ-Ease

MINNEAPOLIS — National Computer Systems, Inc. (NCS) has unveiled a turnkey data collection and information processing system for the human resources marketplace.

The Employ-Ease system utilizes the NCS Sentry Plus hardware, including an NCS Sentry 3000 scanner and an IBM XT hard disk version of the IBM Personal Computer. The system reportedly captures and stores data and generates reports.

In addition to the system's basic capability to administer and score tests and surveys on scannable forms, information processing modules include employment selection, employee data, government compliance and administrative data. Prices of the modular system start at $15,000 from National Computer Systems, 4401 W. 76th St., P.O. Box 9365, Minneapolis, Minn. 55440.

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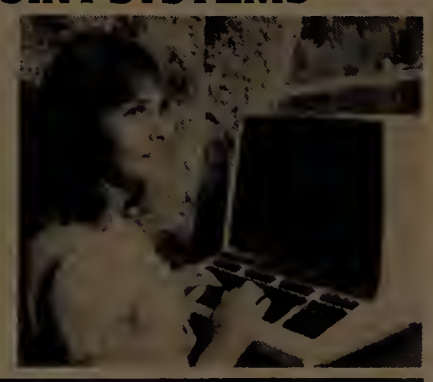

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Zilog Offers Upgrade Path for 16-Bit Chip Users

CAMPBELL, Calif. — Zilog, Inc. has carved out an upgrade path for its 16-bit microprocessor users by taking the wraps from a microprocessor that communicates over 32-bit data paths both internally and externally, is capable of memory management and can execute 5 million instructions per second.

Software- and hardware-compatible with the firm's 16-bit Z8000 CPU line, Zilog attributes the Z80000 chip's throughput speed to a 256-byte cache memory that stores copies of the most recently referenced main memory locations. The cache memory significantly cuts down the number of off-chip memory fetches the CPU has to perform, a spokesman explained.

Users upgrading to the new chip can do so without making any software modifications, a spokesman said. Zilog contends the migration path the Z80000 offers Z8000 users is a "natural" one in that the 32-bit chip's software is a binary-compatible extension of the 16-bit chip's. The Z80000, like the Z8000, uses the company's Z-Bus and employs the same interconnect protocol used by all Zilog equipment introduced since 1979, meaning the 32-bit chip is compatible with all Z8000 peripherals.

According to the company, the chip's memory management facility needs no external support circuitry. The unit maps 32-bit logical addresses generated by the CPU into 32-bit addresses for referencing memory. Users calling on the chip's memory management capabilities do not experience a degradation in performance because of the chip's pipelined architecture, a spokesman explained.

Scheduled to be available in next year's second quarter, the Z80000 will cost $150 each when ordered in 1,000-unit lots, the company said from 1315 Dell Ave., Campbell, Calif. 95008.

Peripherals Introduced For Domain

CHELMSFORD, Mass. — Apollo Computer, Inc. has announced three peripherals reportedly designed to enhance printer economy, user ease and network security for Apollo Domain users.

The Domain mouse cursor positioning device has three user-definable buttons said to provide flexibility in creating a personalized user environment. It is fully integrated with the Domain interactive display manager and is software-compatible with Domain's touch pad and data tablet cursor positioning devices.

The Hardcopy Device Multi-Mode Printer reportedly can print or plot in a variety of software modes. For near letter-quality performance, the bidirectional, logic-seeking, dot matrix printer runs at 100 char./sec. In line-printer mode, it runs at 400 char./sec and for graphics plotting, it offers resolution of 72 dot/in. With a 2K-byte line buffer, pedestal and paper-feed tray, the device costs $3,800.

Finally, the firm introduced a network switch, said to enhance the Domain network system's reliability, availability and flexibility. The switch allows users to divide large networks along organizational boundaries, simplifying network modifications and isolating network faults.

The Domain network switch is priced at $250 from Apollo Computer, 15 Elizabeth Drive, Chelmsford, Mass. 01824.

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PROLOG

John likes anyone who likes wine and food.

Prolog: likes(john,X) :- likes(X,wine), likes(X,food).

Is there anything that both Smith and Jones supply, but which Smith supplies at lower cost?

Prolog: ?- supplies(smith,X,Cs), supplies(jones,X,Cj), Cs < Cj.

Introduction to Prolog, A 'Fifth-Generation' Language

By William F. Clocksin and Jon D. Young

Interest in the Prolog programming language continues to grow, in part because of the much-publicized fifth-generation computer project. The Japanese describe Prolog-derivative languages as fundamental to their supercomputer software effort.

With the appearance in the marketplace of knowledge-based "expert systems," commercial interest is focusing now on practical, reliable and efficient expert systems employing Prolog and other languages.

Alain Colmerauer and associates at the University of Marseilles, France, originally devised Prolog about 1970. Prolog interpreters now exist for a wide range of computers.

With the development of an efficient Prolog compiler by David Warren and Fernando Pereira at the University of Edinburgh, the language emerged as the practical choice for writing sophisticated knowledge-based programs. Many Prolog applications involve large and complex programs that probably could not be written if not for the relative ease of doing so in Prolog.

Current areas of Prolog application include:

- Systems that understand typewritten natural language, both in simple stories and data base queries.
- Expert adviser and interpretation systems.
- Architectural design, site planning and logistics.
- Biochemical analysis and drug design.
- Symbolic equation solving, compiler writing.
- Abstract problem solving and plan formation.
- Knowledge-based systems research.

Prolog programs are being used in commercial applications, notably in Hungary, where the government has encouraged industrial use of the language. Applications include using chemical interactions to design drugs, using knowledge about building codes and architectural practice to design buildings and software engineering.

Prolog has also been applied to English-language query of data bases. For example, the Chat system, written by Warren and Pereira, contains a geographical data base and an English interface that can deal with complicated queries such as, "Which are the continents no country in which contains more than two cities whose population exceeds one million?" Chat first

IN DEPTH

parses the query, translating it into a logical expression that can be evaluated as a Prolog program. Next, Chat rewrites the expression in an optimized form that can probe the data base more efficiently. Finally, the optimized expression is evaluated as a normal Prolog program that probes the data base and answers the query in English.

Most queries can be answered in less than one second on a mainframe, but as much as two seconds may be required for queries as complicated as the one just discussed. Work on Chat and its derivatives continues at SRI International, Inc. in Menlo Park, Calif., where Warren and Pereira are now based. (In Los Angeles, Silogic, Inc. has begun marketing some of this country's first Prolog-related products — a line of Prolog interpreters for Zilog, Inc. Z80-based systems and Digital Equipment Corp. Decsystems, PDP-11s and VAX-11s.)

Other Applications

The Mecho system, developed by Alan Bundy and others at the University of Edinburgh, solves mechanics problems stated in English taken from school mathematics texts. An example taken from the area of pulley problems would be, "Two particles of mass B and C are connected by a light string passing over a smooth pulley. Find the acceleration of the particle of mass B."

Mecho consists of three modules, each written in Prolog. First, a natural-language module translates the English input into a symbolic representation of the meaning of the input. Next, a problem-solver module uses knowledge of mechanics to set up the equations of the problem, and finally, an equation solver uses symbolic algebraic method to solve equations that may be as complicated as simultaneous nonlinear inequalities. A key theme throughout the Mecho system is the use of meta-knowledge, or "knowledge about knowledge," to control and constrain the search for solutions.

Researchers find Prolog is well-suited to implementing knowledge-based expert systems. An expert system generally consists of three parts: a data base of knowledge (facts and rules) about a particular domain, an "inference engine" for generating and controlling logical deductions and an interface for communicating with the user. Prolog itself provides a powerful data base and one kind of inference engine. Other types of inference engine as well as interfaces to the user and to remote data bases have been implemented completely in Prolog by a number of researchers.

Many of the expert systems written in Prolog have satisfied the criteria for knowledge-based systems:

1. Knowledge in the data base can be easily examined, changed and extended.

2. The system can explain its deductions.

3. The system is able to reason judgmentally, using confidence factors, as well as exactly.

The Orbi system, written in Prolog at the University of Lisbon, can answer questions

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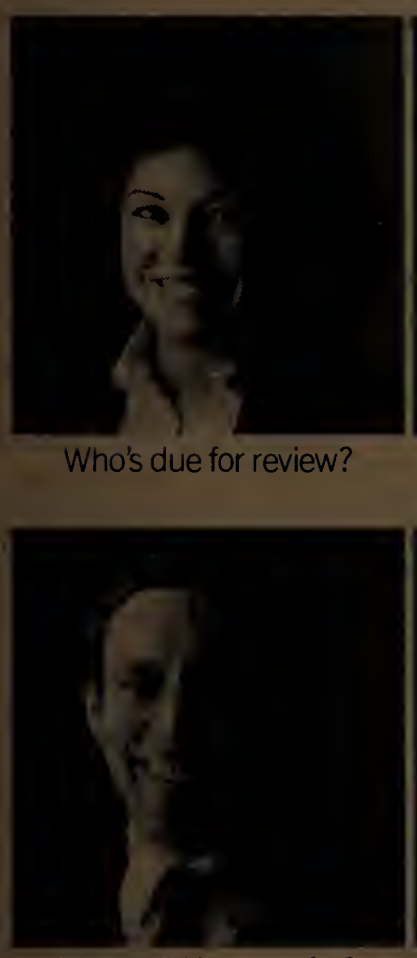
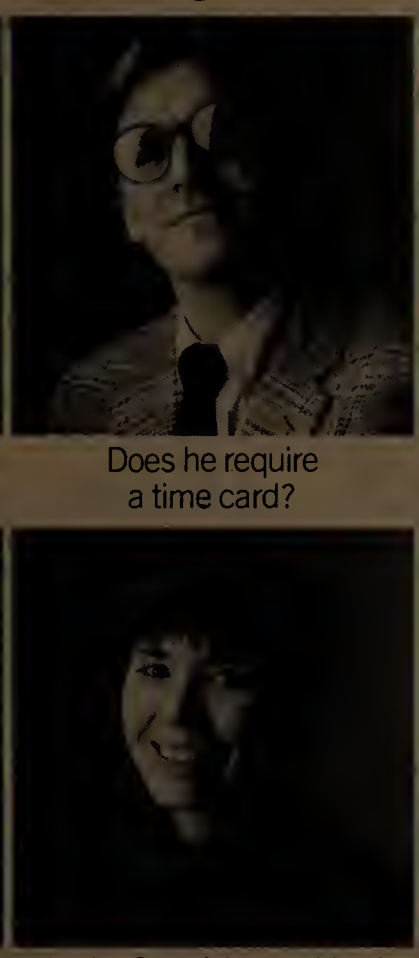
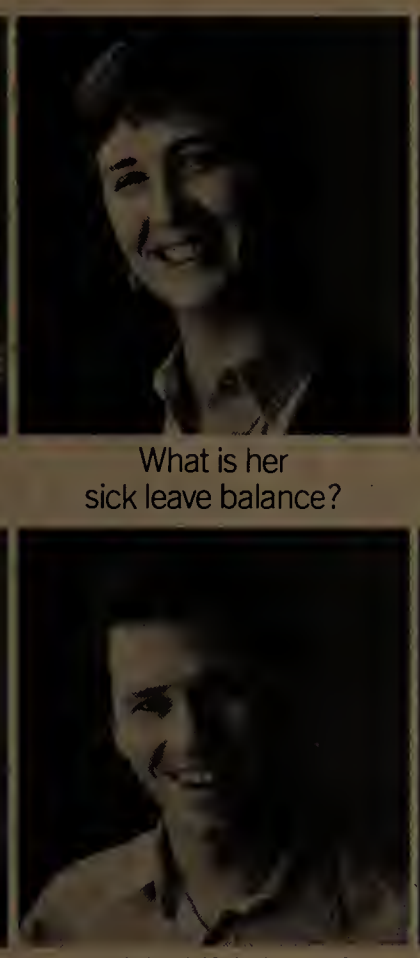


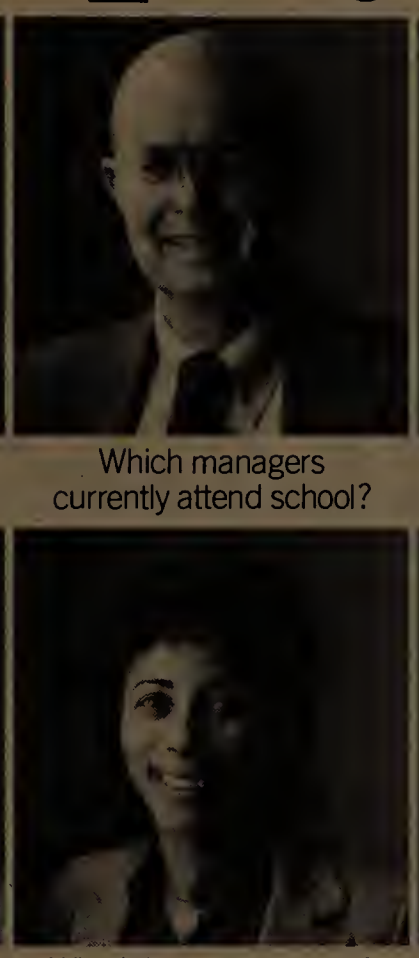
Who's due for review?



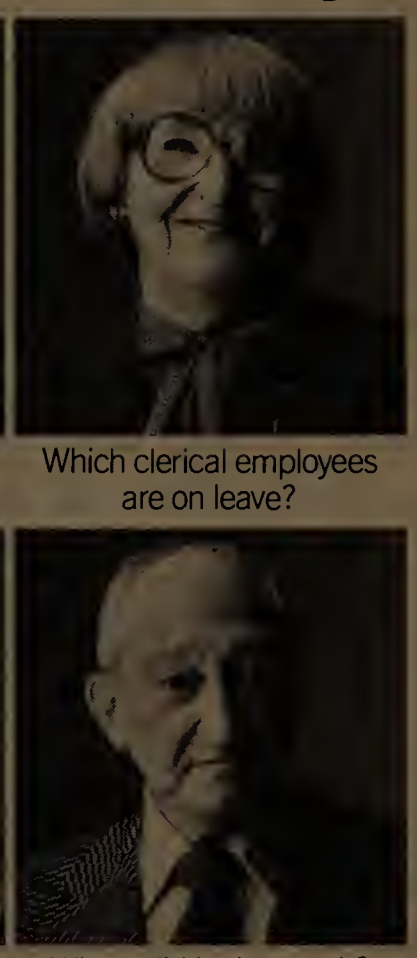
Does he require a time card?



What is her sick leave balance?



Which managers currently attend school?



Which clerical employees are on leave?

When did he transfer?

Is she Spanish speaking?

Which shift is he on?

What's her salary range?

Where did he last work?

Is he exempt from overtime?

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Is she the best applicant?

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(stated in Portuguese) on environmental resources, such as whether a particular map reference is suitable for an industrial site. Orbi can explain its reasoning in a way that makes sense to the user, who is trained but not expert. For example, when an Orbi user wanted to know why a particular map reference showed a high aptitude for intensive argiculture, Orbi generated the following reply constructed from canned fragments (translated from Portuguese):

"The more importantly occurring aquifers present protection since they belong to the captive meso-pliocenic layer. The superficial drainage of rain is very low given that the characteristics of the hydrographic basin to where the point belongs and median annual pluviosity determines a corrected roughness number of less than 150. The soil is considered to have a low risk of erosion since it presents as limitations those associated with its reduced effective thickness. Therefore, the soil is susceptible to highly intensive agricultural usage. This soil is very likely totally or partially protected by Article 1 of Decree 308/79."

Orbi's authors found Prolog to be an excellent language for expert system implementation and gave three reasons:

1. The various components of an expert system are integrated into the same simple formalism: natural language processing, knowledge base, explanation facility, relational data base, meta-knowledge and interpreters for specialized control.

2. Compactness of expression, together with an efficient implementation, permits programs as large as expert systems to be used practically.

3. The dual semantics, declarative and procedural, facilitate the development of meta-knowledge features.

Programming in Prolog

Prolog is naturally suited to diverse applications that require symbolic computation. This approach contrasts with more conventional views of computation as follows. First, the basic data elements used during symbolic computation are not restricted to numbers and comparison keys, but may be arbitrary structures of symbols and relationships among them, possibly containing structures to be interpreted as programs. Second, the basic operations are not restricted to comparison and assignment but, instead, processes of matching and constructing symbol structures.

The Prolog symbol structures are called "terms," out of which every complete Prolog statement (or "clause") is constructed. Clauses may represent either facts necessary to the program (or data base) or rules specifying how to derive facts from other clauses when a program is used. A Prolog program contains nothing but such clauses, so the language is very simple. In fact, it is largely comparable with predicate calculus, grammatically far less complex than most conventional programming languages.

The programming style

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implied by Prolog makes structured programming much more convenient than with Pascal, for example.

Facilities for symbolic computation are of course provided in several artificial intelligence languages such as Lisp and POP-2, but Prolog is unique in combining those computations with program control based not purely on the flow of control through adjacent program statements, or evaluation of functions and expressions, but on an automatic procedure for logical inference.

The Prolog system uses a proof procedure to derive relevant logically valid consequences of a goal, using its given stored facts and rules together with the input goal. Of course, it is the programmer's responsibility that the facts and rules given are adequate to the problem in hand and the solutions wanted. Thus, the idea of logic programming has developed, in which computation is seen as controlled logical deduction.

This method is especially suitable for symbolic operations, since they are very often most clearly, concisely and completely expressed in logic. Prolog provides immediate facilities for executing programs which, without Prolog, might require programming into bulkier and more complex code. The program execution mechanisms used in Prolog vary slightly in detail, but all are based on a "unification" pattern matcher and a mechanical proof procedure discovered by Alan Robinson at Syracuse University.

The denotational semantics of logic programming have been rigorously derived by John Lloyd and others at the University of Melbourne in Australia. Research into these and other logic programming mechanisms continues, and advanced areas in parallelism, nondeterminism and pattern-directed procedure call are being investigated.

A Prolog Primer

Programming in Prolog may be viewed as:

- Specifying some facts about objects and relationships.
- Specifying rules about objects and relationships.
- Asking questions about objects and their relationships.

The program that is presented to a Prolog system consists of a data base that contains the facts and rules relevant to the problem. The problem is then solved by formulating it as a query presented to the program, which is used to determine an answer. Prolog is a conversational system: a computer terminal is used to enter facts, rules and queries; the answers are printed on the terminal's display.

First, facts. When we say "John owns the book," we are declaring that a relationship (ownership) exists between one individual object "John" and another individual object denoted by "the book." This relationship has a particular order: John owns the book, but the book does not own John.

When we ask the question "Does John own the book?" we are attempting to find out about a relationship. "John owns the book" translates

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into a Prolog fact as follows:

```
owns(john,book).
```

The notation used here is perhaps the most common for Prolog. In this notation, the names of all relationships and objects must begin with a lowercase letter. The relationship is written first, and the objects involved are written separated by commas. The whole group of objects is enclosed in a matching pair of parentheses. A period comes at the end of the fact. The objects listed within the parentheses must appear in a consistent order. The particular order is not important, provided that the programmer is consistent. In the example, we have put the owner first and the object owned second. If we introduce a "likes" relationship between a liker and a liked person, we may write *likes(john,mary)*, but it is not the same fact as *likes(mary,john)*. If we wish to represent the fact that John likes Mary, and that Mary likes John, we must say so in two separate facts.

The name of the relationship is called a predicate, and the objects inside the parentheses are called the arguments. So, the above example is a fact about the predicate *likes*, which has two arguments, *john* and *mary*.

Next, questions. Once we have collected some facts together in a data base, we can ask questions about them. Let us construct a data base of friends, consisting of a list of "likes" predicates:

```
likes(john,mary).
likes(john,fred).
likes(mary,fred).
likes(fred,john).
```

In Prolog, we ask, "Does John like Mary?" by typing:

```
?- likes(john,mary).
```

Questions are prefixed by a *?-* sign as shown. To answer this question, the Prolog system examines each entry in the data base, looking for facts that match the question. Two facts match if their predicates are spelled the same and if they have the same arguments. In this case, there is indeed a matching fact, so the Prolog system answers *yes*. Given the above data base, if you ask the question *?- likes(mary,jane)*, then the Prolog system will answer *no*. This response actually means "cannot be proved by what is in the data base."

It is also possible to use variables. In Prolog, a variable takes the place of an object that the programmer may be unable or unwilling to name at the time he writes the program. A variable stands for an object; its usage is closer to that of variables in high-school algebra than those in conventional computer languages. In particular, variables may not be assigned to, but we may assert equality relationships among, objects that can include variables.

Furthermore, variables can appear as the arguments of terms, in which they can be viewed as partial specifications of data structures that can be fully instantiated at a later time. For example, we could ask the question, "Is there some thing X that John likes?" by typing:

```
?- likes(john,X).
```

In our notation, any name that begins with an uppercase letter is a variable. In the above data base, two facts would match this question. The first is mary, so Prolog would print out:

```
X = mary
```

and wait for a reply from you. If you type the return key on the keyboard, the system will abandon the search for more matching facts. If you type a semicolon, then the system will continue the search. A more exhaustive interaction might look like this:

```
?- likes(john,X).
X = mary;
X = fred;
no
```

The last reply is no, meaning that there are no more facts that can satisfy the question.

Another way to ask more complicated questions is to use conjunctions. If we want to know whether John and Mary like each other, we can state the question in the form of two goals, separated by a comma. The comma is pronounced "and":

```
?- likes(john,mary), likes(mary,john).
no
```

Using variables, we can ask if John likes anyone who likes John:

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```
?- likes(john,X), likes(X,john).
X = fred
```

In the first goal of this question, X is initially unknown. We say that X is not instantiated (meaning that it does not have an instance). However, when searching the data base, Prolog finds a fact that matches if X is *mary*. The variable X is now instantiated to *mary*. As a result, any occurrence of X in the question is replaced by *mary*.

Next, the second goal is considered: *likes(mary,john)*. This goal fails, because there is nothing to match it in the data base. But there might be some other fact that matches the first goal (remember we had not exhausted the data base on the first goal). Indeed there is, when X is *fred*. So now, X is instantiated to *fred*, and the second goal is tried again: *likes(fred, john)*. This time the goal succeeds, because a matching fact is found in the data base. Both goals thus succeed, and Prolog prints out the first answer as shown above.

It is important to understand the idea that Prolog alternates successively between two neighboring goals in a conjunction to find an answer that satisfies them both. An arbitrary number of goals separated by conjunctions may participate in this way. This is the basis of a very powerful technique known as backtracking, which will be discussed more later.

Next, rules. Many times it is useful to express a fact in the form of a rule. For example, if we wanted to express the fact that John likes everyone who likes wine, it would be tedious to add more facts to the data base to express this. It would be far simpler to store a rule about what John likes, instead of listing all the people John likes. Suppose we wished to represent the rule that John likes some thing X provided that X likes wine. We write this as a rule, made up of a head and a body. The head and body are separated by a :- symbol like this:

```
likes(john,X) :- likes(X,wine).
```

The rule is made up of a head relationship, *likes(john,X)*, a separator :- and a body, which in this example consists of the single relationship *likes(X,wine)*. This rule is pronounced, "John likes X provided that X likes wine." You could also say, "John likes X if X likes wine."

Rules may be entered in the data base the same way as facts. When programming, you will generally put a mixture of facts and rules in the data base. An entry in the data base, whether a fact or a rule, is called a clause. When Prolog encounters a rule when searching the data base for a clause matching a question, it attempts to match the head of the rule with the goal in the question (using the definition of "match" given above). If the two match, then the body of the rule contains subgoals that must be satisfied in order to satisfy the original goal. These subgoals, if any, are attempted in the same "match and backtrack" style.

Consider a very simple rule that tells us about sisters. Suppose we are given two people called X and Y. Person X is a sister of person Y provided that X is female and X and Y have the same parents. This definition translates directly into a Prolog rule as follows:

```
sister(X,Y) :- female(X), parents(X,Ma,Pa),
    parents(Y,Ma,Pa).
```

This rule is read, "It is a fact that X is a sister of Y provided that: X is female, and the parents of X are some objects Ma and Pa, and the parents of Y are [the same] Ma and Pa." Let us supply some facts that will help the rule to succeed:

```
female(alice).
female(victoria).
male(albert).
male(edward).
parents(edward,victoria,albert).
parents(alice,victoria,albert).
```

We have said, "It is true that Alice is female," "It is true that Edward is male," "It is true that the parents of Alice are Victoria and Albert" and so forth. The single rule above, together with the six facts, permits us to ask questions about certain relationships. For instance, we may ask whether Alice is a sister of Edward:

```
?- sister(alice,edward).
yes
```

It is a fact that Alice is a sister of Edward. Let us try a few more questions, shown with the answer that

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Prolog gives. Notice the use of variables in some questions:

```
?- sister(alice,victoria).
no

?- sister(alice,alice).
yes

?- sister(alice,X).
X = edward

?- sister(X,Y).
X = alice, Y = edward;
X = alice, Y = alice;

?- sister(X,X).
X = alice

?- sister(X,Y), parents(Z,_,Y).
no
```

Using an underline character where a variable is allowed means the anonymous, or "don't care" variable.

The last question asked if X is the sister of someone (Y) who is the father of a child (Z). The answer Prolog gives is no. This means that there is nothing in the data base that can satisfy such a question. Notice that the "male" facts in the data base are never used by this rule. In this sense they are redundant, but we listed them here to give a sense of completeness. Notice that the "sister" rule makes explicit the notion that a female is her own sister. It is possible to modify the rule to add an extra condition that the two candidate objects for sisterhood must be different objects.

Backtracking

How is a Prolog question (or goal) evaluated by the system? Consider again the question:

```
?- sister(X,Y), parents(Z,_,Y).
```

Since these two goals are connected by a conjunction, Prolog needs to find some instances in the data base that satisfy both goals. Think of a conjunction of goals connected by "," as a sequence of neighbors. To satisfy a conjunction of goals, an attempt is made to satisfy each goal in the conjunction, from left to right. First, *sister(X,Y)*. Are there any facts or rules in the data base to satisfy this? The data base is searched (literally) from top to bottom. Immediately it finds our rule for sister shown above. The body of this rule is now interpreted as a new set of goals, and the left-to-right evaluation proceeds for *female*, *parents* and *parents* again. If (and only if) the "sister" goal has been satisfied, Prolog continues from "sister" by trying to satisfy the next goal *(parents(Z,_,Y))* in the original question.

Each particular goal in a clause may either succeed or fail when an attempt is made to satisfy it. If it succeeds, then Prolog attempts to satisfy its neighbor on the right. If there are no more neighbors on the right, then the entire conjunction succeeds. If, however, a goal fails, then an attempt is made to resatisfy its neighbor on the left by finding a further possible answer for it, then proceeding rightward as before. If a goal fails, and it does not have a left-hand neighbor to resatisfy, then the entire conjunction fails.

What about variables during backtracking? Any variables in a goal may become instantiated to some data structure when the goal succeeds. As soon as a variable becomes instantiated to some data structure, every occurrence of the variable (having

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the same name) in the goal will be immediately instantiated to the same data structure. If a goal fails, then any variables that may have been instantiated by the goal's previous success (if any) are forgotten. This is the essence of backtracking. Attempting to satisfy a conjunction of goals essentially involves a depth-first left-to-right search of a proof tree.

Here is a collection of simple one-rule examples together with some explanation of new parts. Each rule uses backtracking to find a set of objects that satisfy each goal in the body of the rule. Remember that these rules are not queries but rather compact ways of expressing a complex relationship among objects.

Example 1: "John likes anyone who likes wine and food."

```
likes(john,X) :- likes(X,wine), likes(X,food).
```

It can be established that john likes X, provided that X likes wine and X also likes food.

Example 2: "X was on the throne during year Y if: X reigned between years A and B, and year Y falls between years A and B." In this example, we assume that clauses defining years_of_reign exist in the data base. (The underline character '_' can be included within a name, as in years_of_reign, to improve legibility. In this context, it cannot be confused with the anonymous variable.) The infix operators ">=" and "=<" have the usual meanings of "greater than or equal to" and "less than or equal to":

```
on_throne(X,Y) :-
    years_of_reign(X,A,B), Y >= A, Y =< B.
```

Relevant clauses for the data base pertaining to the 15th century House of Avis (Portugal) are:

```
years_of_reign(duarte,1433,1438).
years_of_reign(alfonso_V,1438,1481).
years_of_reign(john_II,1481,1495).
```

Example 3: "The population density of X is Y." Here we assume that clauses for relating a country with its population, and a country with its area, are provided in the data base. The infix *is* operator evaluates the arithmetic expression on its right-hand side and matches it with the object on its left-hand side. Remember this, because we shall use *is* later.

```
density(X,Y) :- population(X,P), area(X,A),
    Y is P/A.
```

Relevant clauses for population and area (in millions of people and millions of square miles) for 1976 might look like:

```
population(usa,203).      area(usa,3).
population(india,548).    area(india,1).
population(brazil,108).   area(brazil,3).
```

General Data Structures

More interesting examples involve data structures other than numbers and atoms. Arbitrary data structures are represented as terms that can have any number of components. For example, in a parts data base, we need to describe a part in more or less detail. If we wish to describe a laser focusing lens, we must record its wavelength (in nanometers), diameter (in millimeters) and focal length (in millimeters). We could define a structure called "lfl" with these three components. One particular laser focusing lens can be denoted as:

```
lfl(325,10,20)
```

and could take part in questions just as any other individual. Likewise, a spur gear is represented by its diametral pitch, number of teeth and material, for example:

```
spur(120,65,brass)
```

Given a parts data base relating a supplier to a part and a cost, the portion of the data base dealing with laser focusing lenses and spur gears might look like this:

```
supplies(smith,lfl(325,10,20),143).
supplies(smith,lfl(325,50,1100),219).
supplies(jones,lfl(488,10,18),143).
supplies(jones,lfl(904,50,750),147).
supplies(jones,lfl(633,5,9),143).
supplies(smith,spur(120,40,brass),2).
supplies(smith,spur(120,52,steel),3).
```

We might make the following queries:

```
?- supplies(X,lfl(904,_,_),Y), Y < 200.
?- supplies(smith,X,Cs), supplies(jones,X,Cj),
    Cs < Cj.
```

The first query instantiates X to the name of a supplier who can supply laser focusing lenses for 904 nanometers which cost less than

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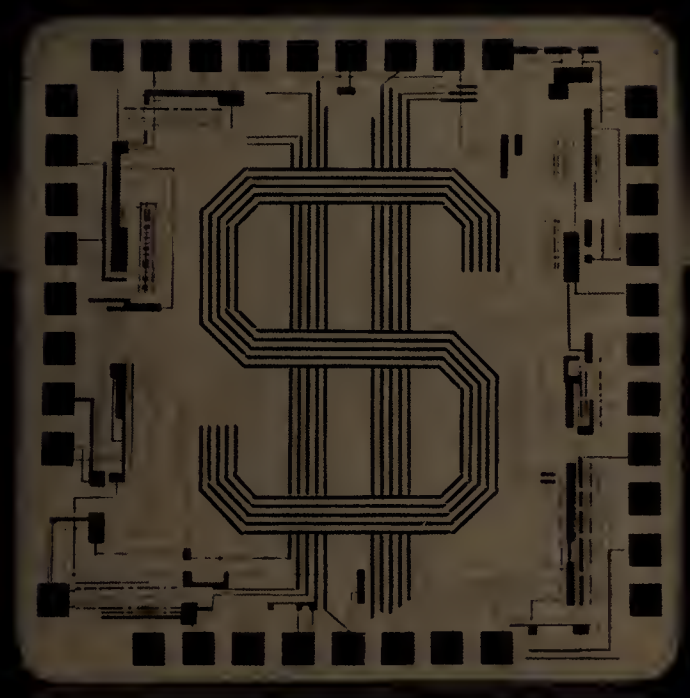

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IN DEPTH

$200. The second query asks whether there is anything that both Smith and Jones supply, but which Smith supplies at a lower cost.

Given a structure such as spur(X,Y,Z), the atom *spur* is called the functor, and the arguments enclosed in the parentheses are called the components. When used as an individual, as in the above example, the structure can never be mistaken for a goal or clause. However, notice that clauses (facts and rules) are represented as structures. This is no accident. The notion that programs should be written using the same data structures that are manipulated by programs is a feature that Prolog shares with Lisp. The important application of the program-as-data notion is when performing natural language query of data bases. Recall our prior discussion of the Chat system, which converts the English query by several stages ultimately into a final Prolog goal, which is executed by the system.

For another use of structures, the Portuguese monarchs discussed earlier can be represented more flexibly as a structure. We choose monarch as the functor and the name, "serial number" and country ruled as components.

For example, we could represent *monarch(john,2,portugal)*, *monarch(john,2,sweden)*, because Portugal and Sweden were ruled by different John IIs.

```
years_of_reign(monarch(duarte,0,
    portugal),1433,1438).
years_of_reign(monarch(john,2,portugal),
    1481,1495).
years_of_reign(monarch(john,3,sweden),
    1568,1592).

on_throne(Country,Monarch,Serial,Year) :-
    years_of_reign(monarch(Monarch,Serial,
        Country),A,B),
    Year >= A,
    Year =< B.
```

This example will work even if we leave out the serial number of a monarch by replacing its component in the query by an uninstantiated variable. For example, to ask which John ruled an unknown country in 1588 (the year of the Spanish Armada), we would ask:

```
?- on_throne(C,john,S,1588).
C = sweden
S = 3
```

As with other languages used by researchers in artificial intelligence, a data structure known as the list plays an important role in Prolog programming. The list cell, which is represented as a predicate (named "."), has two arguments called the head and the tail. Lists are binary trees constructed from list cells. As with the Lisp language, denoting binary trees using the dot notation can be cumbersome. So, there is a simpler notation for lists. Terminal nodes of the tree are written separated by commas, and all are enclosed in a pair of square brackets. The empty list is denoted []. Examples of lists are:

```
[john,wants,to,join,the,company]
[the,cardinal,drew,off,each,plum,
    colored,shoe]
[[This],list(is,made+of),[Several,[types]],
    of,structure]
[]
```

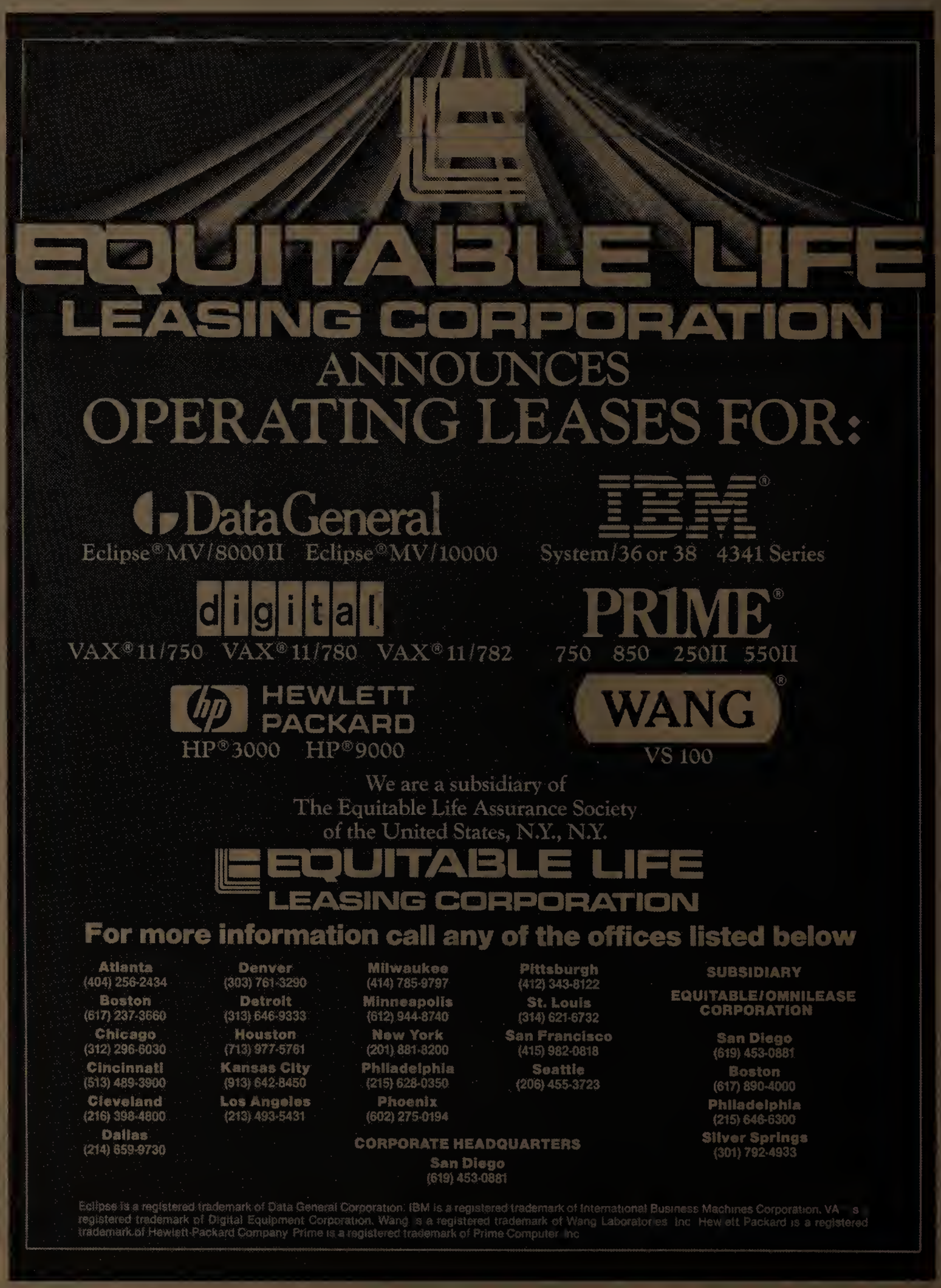
The notation [X|Y] denotes the list whose head is X and tail is Y. This is used in pattern matching. For example, suppose we wish to define a predicate that succeeds if its first argument is a member of the list given as its second argument. The first clause about this problem is, "It is a fact that X is a member of a list if X is the head of the list." The second clause is "X is a member of the list if X is a member of the tail of the list." Putting these in a procedure yields:

```
member(X,[X|_]).
member(X,[_|L]) :- member(X,L).
```

Here we are using Prolog clauses to describe a program, but notice how it is no different from an entry in a data base. We can ask the following questions:

```
?- member(darwin,[marx,darwin,freud]).
yes
?- member(X,[marx,darwin,freud]).
X = marx;
X = darwin;
X = freud
```

The first query tests whether Darwin is in a list of influential 19th Century thinkers. The second query instantiates a variable to a member of the set; there are three possible solutions to this query, so the member



IN DEPTH

goal succeeds once for each of the three instantiations shown.

Here is an interesting way to use member to find out if two lists differ — that is, if one list has an element that is not in the other. This is an example of what some people call "nondeterministic programming," and it relies on the above definition of "member" that allows backtracking:

```
differ(X,Y) :- member(Z,X), not( member(Z,Y) ).
```

To evaluate this expression, Prolog cycles back and forth between the two neighboring member goals until both are satisfied or both fail. The goal *not(X)* succeeds if its argument fails when considered as a goal. Likewise, it fails if its argument succeeds.

As another example of backtracking, here is a program to search a maze. The goal *go(X,Y)* succeeds if it is possible to go from room X to room Y:

```
go(X,X).
go(X,Y) :- door(X,Z), go(Z,Y).
```

To supply a maze, we simply add to the data base facts about where the doors are:

```
door(a,b).      door(b,e).
door(b,c).      door(d,e).
door(c,d).      door(e,f).
door(g,e).
```

The above *go* procedure might get into loops by re-searching rooms it has searched before. To avoid this problem, we can keep a list of room numbers that we have visited and ensure that we enter only rooms we have not been to before. In this modified version of the program, T is the "trail" of room numbers, represented as a list:

```
go(X,X,_).
go(X,Y,T) :- door(X,Z), not(member(Z,T)),
     go(Z,Y,[Z|T]).
```

The rightmost *go* goal collects the current room number (Z) for its list by making a list that has Z as its head and the "list so far" (T) as its tail. The whole thing is passed to the recursive call of go. The question you would ask to search a maze would initialize the list to the empty list for normal use (as in the query *?- go(a,z,[]).*). Initializing the list to contain some room numbers would permit the program to search the maze, avoiding those rooms.

Pattern Matching

Advantages of pattern matching can be shown by writing a program to convert one arithmetic expression into another. Compilers are an especially attractive example. The Edinburgh Prolog compiler, which generates very efficient code for the Digital Equipment Corp. Decsystem-10, is written in Prolog.

Let us develop an example that converts an expression into its symbolic derivative. This procedure is often presented as a list of rules in mathematics books, and it is nice to find that the rules translate easily into Prolog. We use the functors +, - and so forth to represent nonterminal nodes of expression trees. These functors have a built-in syntax declaration as right-associative infix operators with the usual precedence relationship.

We shall define the predicate *d(X,Y,Z)*, meaning "the derivative of X with respect to Y is Z." Here are a few derivative rules in Prolog. Note the similarity to tables of derivatives as found in mathematics texts:

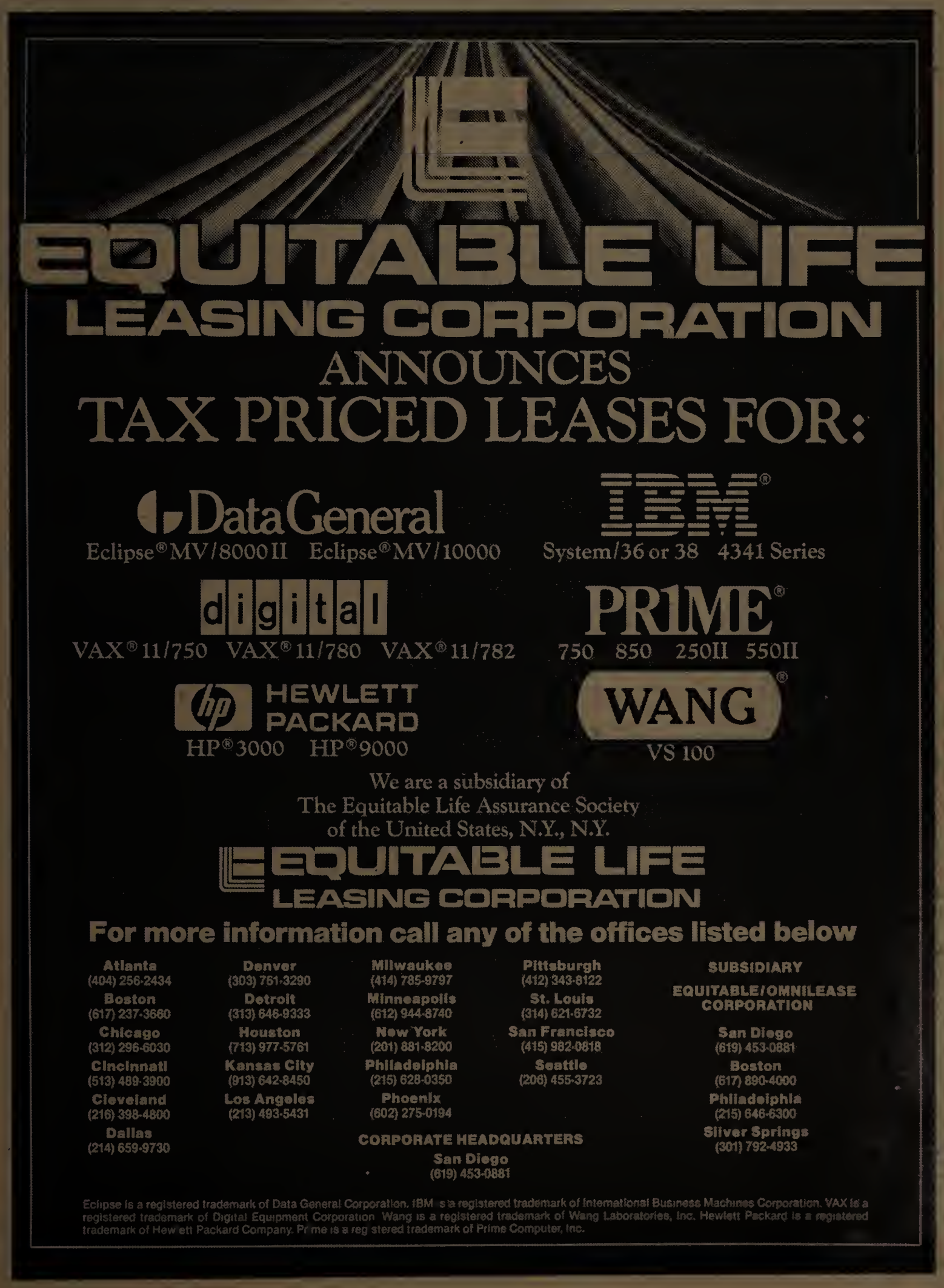
```
d(X,X,1).
d(C,X,0) :- atomic(C).
d(U+V,X,A+B) :- d(U,X,A), d(V,X,B).
d(U-V,X,A-B) :- d(U,X,A), d(V,X,B).
d(C*U,X,C*A) :- atomic(C), C \= X, d(U,X,A).
d(U*V,X,B*U+A*V) :- d(U,X,A), d(V,X,B).
```

And that is a working program. Here is a question and the answer:

```
?- d(x*x-2,x,A).
A = x*1+1*x-0
```

The goal *atomic(X)*, whose definition is built into the Prolog system, succeeds if its argument is an atom or an integer and fails otherwise. We use it here to check whether we are finding the derivative of a constant. The infix "not the same as" operator "\=" fails if its two arguments match and succeeds otherwise.

The above answer is not in an algebraically simplified form. However, we can provide a straightforward simplifier, which consists of two clauses plus some facts about algebra.



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The *simp* predicate is defined such that the goal *simp(X,Y)* simplifies the expression X, obtaining the expression Y. The first clause given below simply states that an atom simplifies to itself, and there are then no more solutions.

The second clause unpacks an expression tree into its node and two branches using the *comp* predicate (defined below), then simplifies each branch recursively, then uses *comp* again to recompose the expression with simplified branches (called S) and then finally checks to see if S is a simplified form using the *s* predicate (defined below). Any simplified form found (F) is instantiated as the second argument to *simp*.

```
simp(E,E) :- atomic(E), 1.
simp(E,F) :-
    comp(E,Op,L,R),
    simp(L,X),
    simp(R,Y),
    comp(S,Op,X,Y),
    s(S,F).

comp(X+Y,+,X,Y).
comp(X-Y,-,X,Y).
comp(X*Y,*,X,Y).

s(X*1,X).          s(1*X,X).
s(X*0,0).          s(0*X,0).
s(X+0,X).          s(0+X,X).
s(X-0,X).
```

Notice that there are pairs of *s* facts for addition and multiplication, to account for commutativity. This works as follows: To simplify an expression E using the s table, we need to first simplify the left-hand argument, then simplify the right-hand argument and then see if the resulting pieces are in our table. Since we recursively simplify the subcomponents of E, it will be in a simplified state when it is time to see if it is in the table. At the "leaves" of the expression tree, there are either integers or atoms. These are simplified into themselves by the first *simp* clause.

The symbolic differentiator and simplifier can then be used as goals in a procedure:

```
diff :-
    write('Type the expression:'),
    read(Exp),
    d(Exp,x,Deriv),
    simp(Deriv,Simplified),
    write('The derivative w.r.t. x is:'),
    write(Simplified).
```

We can use this as follows:

```
?- diff.
Type the expression: x*x-2.
The derivative w.r.t. x is: 2*x
```

Grammar Rules

Because the basic computational mechanism of Prolog is top-down search through a tree of goals, representing parsing problems is especially suited to the Prolog approach. A grammar rule notation can be used for conveniently expressing the grammar of the problem. This simple example shows a way to extract a "meaning" directly from an English sentence without using an intermediate parse tree.

The rules in the box on In Depth/16 translate one of several possible sentences into a representation of its "meaning" in predicate calculus notation. The relations *s*, *np*, *vp*, *rel*, *det*, *n*, *transv*, *intrans* denote respectively the linguistic constituents sentence, noun phrase, verb phrase, relative clause, determiner, noun, transitive verb, and intransitive verb.

For example, if the (ambiguous) sentence "every salesman sells a computer" is parsed by the grammar rules

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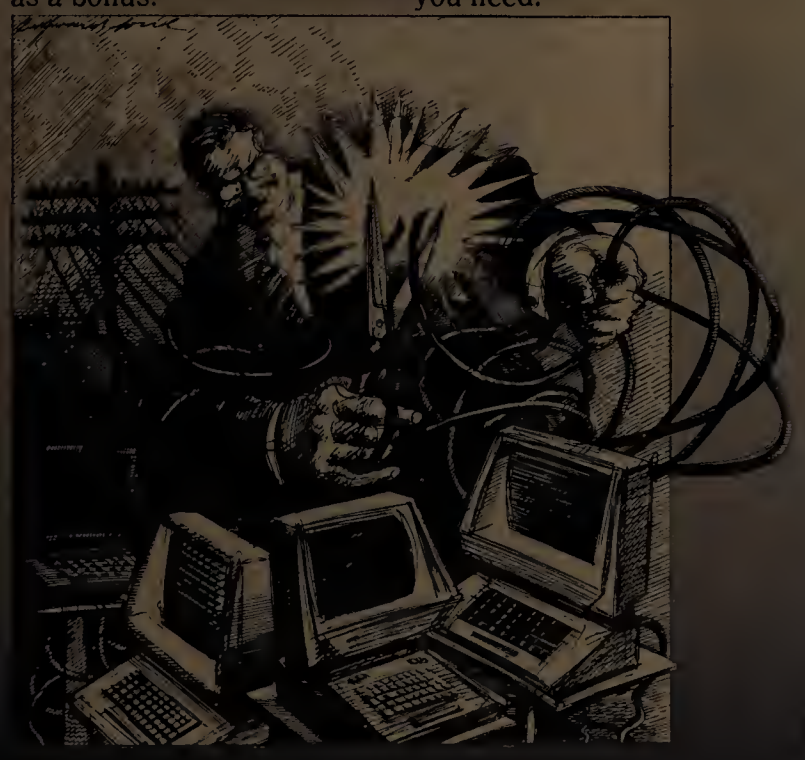

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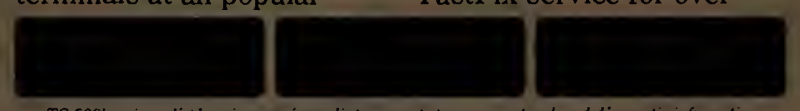

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```
s(P)                                        → np(X,P1,P), vp(X,P1).
np(X,P1,P)                                  → det(X,P2,P1,P), n(X,P3), rel(X,P3,P2).
vp(X,P)                                     → transv(X,Y,P1), np(Y,P1,P).
vp(X,P)                                     → intrans(X,P).
rel(X,P1,and(P1,P2))                        → [that], vp(X,P2).
rel(_,P,P)                                  → [].
det(X,P1,P2,forall(X,(implies(P1,P2))))     → [every].
det(X,P1,P2,exists(X,and(P1,P2)))           → [a].
n(X,salesman(X))                            → [salesman].
n(X,computer(X))                            → [computer].
transv(X,Y,sells(X,Y))                      → [sells].
intrans(X,lives(X))                         → [lives].
```

Grammar Rules

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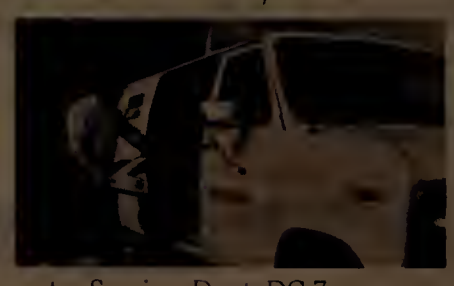

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in the box, the following structure is obtained:

```
forall(X,implies(salesman(X),exists
  (Y,and(computer(Y),sells(X,Y)))))).
```

This is a more specific representation of the sentence, "For every salesman, there is a computer that he sells."

Another meaning of the original sentence is, "All salesmen sell the same computer." This other meaning is available from the program by backtracking. In this program, components of structures are used to represent the meanings of phrases. The last component actually specifies the "meaning" representation, but the meaning of a phrase may depend on several other factors given as the other arguments.

For example, the verb "lives" gives rise to a representation of the form lives(X), where X is something standing for the person who lives. In the case of "every," the meaning has to be applied to a variable and two propositions containing that variable.

The result is a representation that denotes, "If substituting an object for the variable in the first proposition yields something true, then substituting the same object for the variable in the second proposition will also yield something true."

Problems, Rules

Finding symbolic derivatives, simplification and grammar rules are only a few examples of problems that are conveniently handled by Prolog. When a problem is cast into the form of rules, at any given point there is a program that works.

The program may not compute answers for all the questions you ask, but it is a matter of adding more rules to cover these cases.

Furthermore, if the program has been made modular — and Prolog makes this easy to do — then there is usually no need to rewrite existing parts of the program when modifications are required.

For many people, including most artificial intelligence programmers, this is an attractive methodology for programming. At any given point, there is something that works. It is easier to build on a working program, no matter how small. Program construction then involves the task of adding more function while maintaining a working structure. This seems to be exactly opposite the methodology promoted by languages such as Pascal. The Pascal programmer is not always able to have a working program until every last detail of the problem specification is known.

About the Authors

William Clocksin is an assistant director of research at the Computing Laboratory, University of Cambridge, England. He works in the areas of implementing high-level declarative languages such as Prolog and applying logic programming to design automation.

Clocksin is coauthor, with C.S. Mellish, of the textbook Programming in Prolog, *published by Springer Verlag, New York.*

Jon Young is ICL Fellow in Logic Programming at St. Cross College, Oxford, England, where he is applying logic programming to communications tasks such as teaching, discourse and dialogue modeling. He acts as a consultant to several commercial and academic research projects in knowledge-based systems.

Execmail Version Out for DEC Line Of Micros

LOS ANGELES — Executive Software, Inc. has announced that its Execmail electronic mail package for Digital Equipment Corp. PDP-11 and VAX-11 computers is available for the DEC Professional series of microcomputers.

The DEC Professional version of Execmail will include the following features: messages separated automatically into In, Pending and Out baskets; a log of all orders and messages requiring an answer; a routing slip; and the ability to send text and graphics, the vendor said.

Priced at $495, Execmail for the DEC Professional is available from Executive Software at 2024 Hollyvista Ave., Los Angeles, Calif. 90027.

DPD Announces Price Reduction Of Word-11

PLACENTIA, Calif. — Data Processing Design, Inc. (DPD), has announced a reduction in the price of its Word-11 word processing package for Digital Equipment Corp. PDP-11/23, 11/23+, 11/34 and other small PDP-11s with RSTS/E operating systems.

The cost has been reduced 25% from $6,000 to $4,500.

Word-11 features list processing, built-in dictionaries for spelling verification, automatic table of contents and footnoting and on-screen highlighting, according to a vendor spokesman.

Word-11 is also available for larger DEC VAX-11 and PDP-11 systems, a spokesman for the vendor said.

More information is available from Data Processing Design, Suite F, 181 W. Orangethorpe, Placentia, Calif. 92670.

Corvus Cuts Cost Of Workstations

SAN JOSE, Calif. — Retail prices of the Corvus Concept personal workstations have been reduced 25% for the model with 256K bytes of main memory and 28% for the 512K-byte model, Corvus Systems, Inc. has announced.

The new prices are $3,995 and $4,695, respectively.

More information is available from Corvus Systems, 2029 O'Toole Ave., San Jose, Calif. 95131.

DCS Nets Can Integrate Diverse OA Functions

By Russ Hamrick
And Don Fisher
Special to CW‡

As the office of the future draws closer, something is more clearly emerging that should have been anticipated from the outset. There is not just one office of the future; there are many. And new systems continue to appear.

At first glance, this complexity may seem to be an obstacle to the logical development of office automation. But recent software advances strongly suggest that it is, instead, an opportunity. Using the capability of mainframe computers, these software products successfully integrate diverse systems into unified OA networks that are more powerful than any individual component.

Although diversity is welcome, it creates new problems and needs of its own. Diversity of OA equipment can frustrate the promised development of electronic mail and easy exchange of documents. Communications both within and beyond the bonds of a single company is affected.

Such problems do not make individual automated offices impractical, inefficient or inadvisable. Word processing, records processing and even electronic mail can be a boon inside most offices. But without a wider communications capability, the full advantages of the electronic future will not be realized.

Conceptually, the simplest resolution to these problems — at least for a single company — is to abandon diversity and impose one, uniform type of equipment as the company standard. The advantages are obvious: One supplier and one service organization may reduce unit costs; employee training is easier; and overall management is more straightforward.

Another Approach

Another approach to coping with diversity is to provide electronic translation between different devices. If the files of one word processor or personal computer can be transferred electronically to another, the unique advantages of each can be preserved, and each has gained in usefulness. Company capabilities are not compromised by this approach, and the costs of translating do not appear to be excessive.

Because there are substantial differences in the way word processors use sequences of characters to establish the format of documents, successful communications demands careful conversion of every character and of every combination of characters so that the displayed document at the receiving end of the communications link will be as close as possible to the original.

Despite the difficulties, products are emerging in the market that successfully translate between different word processors. All are software based, but most are packaged as hardware devices. Typically, they act as a kind of black-box converter between just two units. Since the software resides in a piece of dedicated hardware, flexibility is limited.

'Word processing, records processing and even electronic mail can be a boon inside most offices. But without a wider communications capability, the full advantages of the electronic future will not be realized.'

A greater drawback of these hardware devices is that they fail to take advantage of the one most powerful OA tool — the mainframe computer. If a company's central computers can become part of the translation process, the full storage and processing capabilities of the mainframes can draw diverse OA functions together into a true companywide document control system (DCS).

Full DCS networks provide:

- Translation among multiple devices and environments.
- Library services, including key word indexing and retrieval and document archiving.
- Electronic mail for documents through multiple-site store-and-forward routing.

DCS networks can add more than document routing and storage. Properly structured, they can increase the capabilities of network components. With appropriate commands added, a lower function word processor can create documents that will print out at a higher function device just as if it had been created using all the capabilities of the second unit.

In advanced DCS networks, the full capabilities of each word processor are shared throughout the network rather than being restricted to one locality.

DCS promises to provide a framework for integrating currently installed WP units and expanding them into multifunction OA systems.

Hamrick is development manager and Fisher is product manager at Integrated Technologies, Inc., an office software developer based in King of Prussia, Pa.

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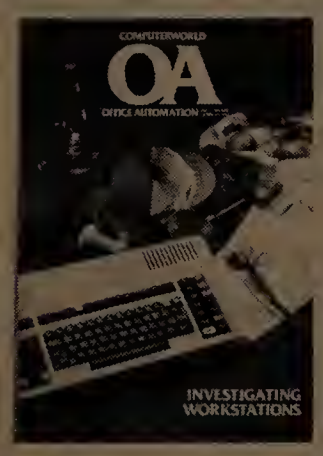

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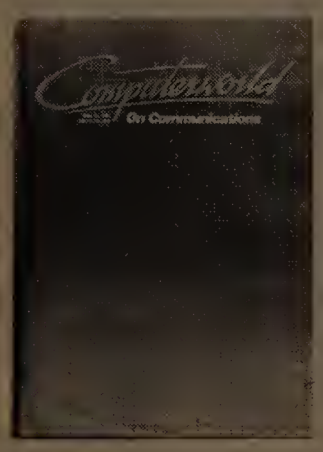

Our newest publication does for communications what OA does for Office Automation. *Computerworld on Communications* covers the fast-merging worlds of computers and communications with in-depth articles on important trends and current topics. Subjects which have been or are scheduled to be covered in *CW on Communications* in its two 1983 issues include: Voice and Data Communications, Local Area Networks, Communicating Personal Computers, Local Loops, Convergent Technologies, and Telecommunications Management.

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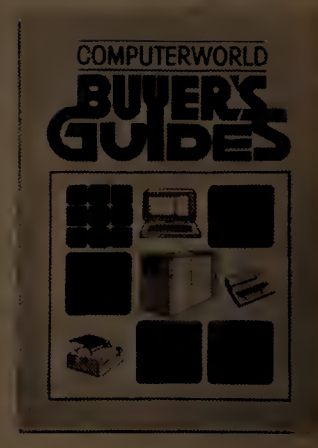

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- 10 Manufacturer (other than computer)
- 20 Finance/Insurance/Real Estate
- 30 Medicine/Law/Education
- 40 Wholesale/Retail Trade
- 50 Business Service (except DP)
- 60 Government-State/Federal/Local
- 65 Public Utility/Communication Systems/Transportation
- 70 Mining/Construction/Petroleum/Refining
- 75 Other User_____

Vendors
- 80 Manufacturer of Computers, Computer-related Systems or Peripherals
- 85 Computer Service Bureau/Software/Planning/Consulting
- 90 Computer/Peripheral Dealer/Distributor/Retailer
- 95 Other Vendor_____

2. OCCUPATION/FUNCTION (Circle one)
- 11 President/Owner/Partner/General Manager
- 12 VP/Assistant VP
- 13 Treasurer/Controller/Financial Officer
- 21 Director/Manager/Supervisor DP/MIS Services
- 22 Director/Manager of Operations/Planning/ Administrative Service
- 23 Systems Manager/Systems Analyst
- 31 Manager/Supervisor Programming
- 32 Programmer/Methods Analyst
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- 38 Data Comm Network/Systems Mgmt
- 41 Engr/Scientific/R&D/Tech Mgmt
- 51 Mfg Sales Reps/Sales/Marketing Mgmt
- 60 Consulting Mgmt
- 70 Medical/Legal/Accounting Mgmt
- 80 Educator/Journalist/Librarian/Student
- 90 Other_____

3. COMPUTER INVOLVEMENT (Circle all that apply)

Types of equipment with which you are personally involved either as user, vendor or consultant
- A. Mainframes/Superminis
- B. Minicomputers/Small Business Computers
- C. Microcomputers/Desktops
- D. Communications Systems
- E. Office Automation Systems

Fisher's Plans For Encore To Preclude 'Nothing'

By Patricia Keefe
CW Staff

NEW YORK — In a much ballyhooed press conference, Kenneth Fisher, president and co-founder of the newly unveiled Encore Computer Corp., made one thing perfectly clear — Encore isn't precluding anything.

But that was as clear as Fisher and his colleagues got about the specific plans of Encore. They described it as an operating or holding company that will provide marketing, financial and administrative savvy for small high-technology concerns with strong products and weak marketing.

Fisher's enterprise is also aimed at ventures that have failed to devote energy to their "most critical technical challenge" — the development of new products to sustain a company's initial mo-

(Continued on Page 55)

Mainframe Software Vendors Joining Micro Counterparts

By Bob Johnson
CW New York Bureau

NEW YORK — In an effort to grab their share of the burgeoning microcomputer software market for DP, mainframe software vendors are teaming up with microcomputer software companies.

Recently announced agreements between Applied Data Research, Inc. (ADR) and Visicorp (CW, July 11) and between Computer Associates International, Inc. (CAI) and Information Unlimited Software, Inc. (IUS), for example, indicate that vendors perceive microcomputer software selection as increasingly important to DP executives in large companies.

What is in store for the DPer who will be doing the procuring? Will the software vendors be "hand-holding" the systems person through the microcomputer software selection process? Does the DPer like the idea of having a single source supplier as opposed to shopping around for microcomputer software?

Targeting these and other questions, *Computerworld* conducted a telephone survey of vendors and users to gauge what effect this new market will have on the DPer.

Joseph Farrelly, vice-president of technical coordination and product planning for ADR, predicted that the DP manager will view the selection of microcomputer software the way he would view the selection of any other piece of software.

'Microcomputer software will have to stand on its own two feet to impress the (mainframe) DPer.'

"Microcomputer software will have to stand on its own two feet to impress the DPer, regardless of the vendor supplying it. The combination of firms with experience in both areas is very desirable, howev-

(Continued on Page 56)

Earnings Off $119 Million

TI Rocked by Second-Quarter Loss

By Bill Laberis
CW Staff

DALLAS — Its worst fears realized and exceeded, Texas Instruments, Inc. posted a $119 million loss or $4.71 per share in its second quarter, a reflection of stagnant sales in the home computer market.

The company had predicted a $100 million loss in mid-June, an announcement which sent TI's stock into a tailspin that at one point reduced its per-share value to $107 from $158. The difference between the recent quarter's actual results and TI's own predictions may indicate a weaker home market than seen earlier.

Further, the company said that it would face a loss for the year if its home computer sales deteriorate further.

TI's revenues in the quarter were virtually flat at $1.099 billion, compared to $1.092 billion the same quarter a year earlier.

The huge quarterly loss, compared with a profit of $37 million or $2.73 per share the same quarter last year, included a $183 million pre-tax loss from computer operations, mainly from lackluster sales of its 99/4A home computer and associated peripherals and software.

Improvements Overshadowed

These losses, the company said, overshadowed improvements in other operations, which produced a profit if the losses from the consumer products division are culled. In particular, semiconductor sales rose sharply in the quarter, as they did across the semiconductor industry, paced by demand for metallic oxide semiconductor and bipolar integrated circuits.

Production cutbacks in internal requirements for home computer production have been more than offset by gains in the merchant semiconductor market, the company said.

Demand for the company's minicomputer and data terminal products remained sluggish, with shipments running

(Continued on Page 58)

In an age of increasingly compact hardware, this full-blown version of a terminal drew its share of comment in La Palma, Calif. The terminal appeared courtesy of Byte Industries, which recently opened its La Palma computer store, the Byte Shop.

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Sales Up, Profits Down

Gould, Prime Reflect Mini Mart

ROLLING MEADOWS, Ill. — Continued softness and some price erosion in the minicomputer market were reflected in the quarterly earnings of Gould, Inc. and Prime Computer, Inc., both of which reported increases in quarterly sales and decreases in profit.

Despite slightly increased revenues, profits for the second quarter at Gould declined by 8% to $19 million or $.42 per share, the company reported. Total sales in the quarter rose to $334 million from $328 million the same quarter last year.

According to a company spokesman, the earnings decline reflects "a continued low level of capital commitment activity for factory automation equipment and lower than planned" delivery of the company's high-performance 32-bit minicomputers.

Echoing the optimism expressed by several other vendors plagued by flat or decreasing earnings, William Ylvisaker, chairman and chief executive officer, said the customer inquiries have led him to predict an upturn in overall business operations for Gould during the second half of 1983.

Prime reported another steep earnings slide, with profit of $6.4 million or $.13 per share, a 41% drop compared with the same period a year earlier when the company posted a $10.9 million profit. Revenues in the quarter rose 16% to $121 million, up from $105 million.

Commenting on the results, Joseph Henson, Prime's president and chief executive officer, said, "Our failure to achieve planned sales revenue resulted in lower than expected net income . . . We expect the second half to show improved earnings." Prime was rocked last month by the resignation of several key marketing and sales people who left to join the start-up Encore Computer Corp., headed by Kenneth Fisher, former Prime president.

MSA's '83 Revenues Climb

ATLANTA — Management Science America, Inc. (MSA) revenues for the first six months of 1983 were $56.8 million, up 46% over the same period last year, the company announced last week. Revenues for the second quarter were $36.9 million, a 63% increase over the same quarter last year.

Net income for the second quarter was $3.2 million, or $.18 per share, compared with $1.2 million or $.09 per share last year. The company earned $924,000, or six cents per share for the six-month period, compared to $219,000, or two cents per share for the first half of 1982.

MSA attributed the performance to growth in the mainframe and micro software markets. Revenues for the company's Peachtree Software, Inc. organization, which makes microcomputer software, were up 150% to approximately $9.2 million for the first half. Mainframe sales were up by 45% for the six-month period. However, revenues from manufacturing systems slipped below expectations, the company said.

During the second quarter, MSA acquired a microcomputer data base management system and a series of accounting micro software oriented toward the German market. The company also acquired Computeristics, Inc.'s order processing and accounts receivable mainframe software business.

Wang Continues Upward Track

LOWELL, Mass. — Continuing on a track of prolific growth propelling it toward the multi-billion dollar category, Wang Laboratories, Inc. reported a 33% increase in sales and a 42% increase in earnings for fiscal 1983.

Total sales for the year ended June 30 were $1.54 billion, up from $1.16 billion a year earlier, while profits totaled $152 million or $1.16 per share compared with $107 million or $.88 per share.

The company reported further that new orders for products and services totaled $1.78 billion, up 34% from the previous year. Figures reported for Wang's last quarter show sales up 34% to $471 billion and profits up 44% to nearly $39 million. New orders in the quarter increased 30% over the same quarter last year.

Apple Boasts 87% Sales Jump

CUPERTINO, Calif. — Apple Computer, Inc. continued to boom along last quarter, posting an 87% increase in sales to $267 million and a 59% increase in profit to $24 million or $.40 per share.

John Scully, company president and chief executive officer, said that accelerated production of the Apple IIe during the quarter ended shortages at the retail level, fattening Apple's bottom line.

Net income did not keep pace with increases in revenues, he said, because of the cost associated with initial shipments of Apple's Lisa business system and the cost of meeting demand for the IIe. Shipments of Lisa, he added, began on shedule in the quarter.

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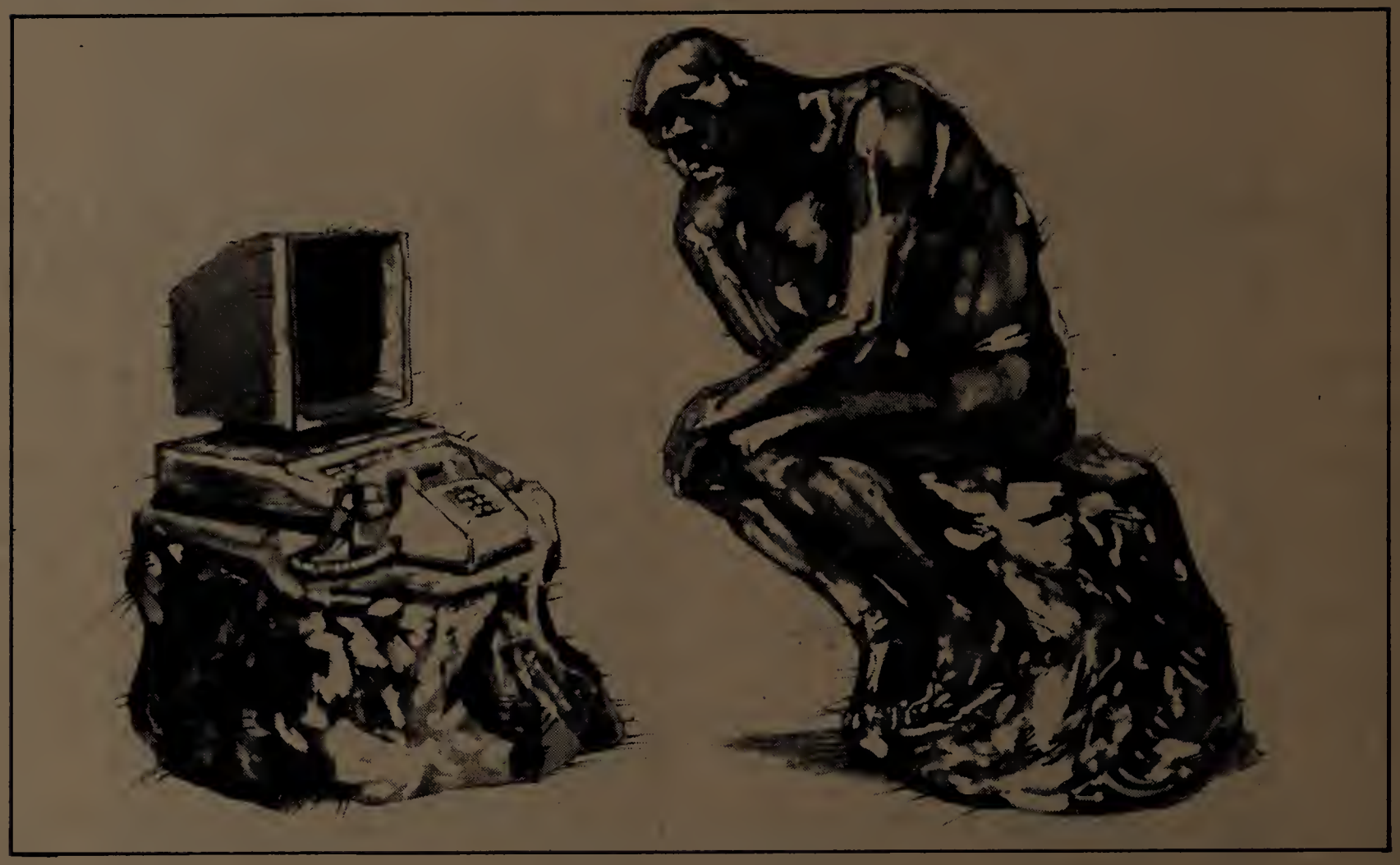

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Harris Airs Plan to Acquire Lanier Business Products

By Bill Laberis
CW Staff

MELBOURNE, Fla. — Two months after dumping its industrial printing equipment business to concentrate on high technology and information processing, Harris Corp. has announced its intended acquisition of Lanier Business Products, Inc. for approximately $400 million.

Labeling the deal a merger, Harris said it will effect the transaction via a stock swap, subject to the approval of the shareholders of both companies. The value of the transaction will be based on Harris' closing stock price when a definitive agreement is signed, with .525 shares of Harris stock traded for each share of Lanier. The deal should be finalized in about four months, Harris said.

Lanier will continue to use its company name, operating as a wholly owned subsidiary of Harris. Gene W. Milner will remain as company chairman and Wesley Cantrell as president of the office automation equipment vendor.

For Harris, the deal may provide the window of opportunity into the lucrative OA market, a window it has tried unsuccessfully to develop in the past.

"They brought together some [Wang Laboratories, Inc.] OIS-related announcements in recent years, but never really went too far with them," said Aaron Goldberg, industry analyst with International Data Corp. in Framingham, Mass. "The Lanier deal will give them much greater penetration into the office than they've had in the past."

Asked to speculate on joint development projects to link Lanier's office offerings to Harris' minicomputer and communications products, Goldberg said, 'I'd guess it would certainly be in Harris' interest to try to link the two product lines whereever possible."

Goldberg noted that the OA area is highly competitive, with major players like Wang and Digital Equipment Corp. certain to make life difficult for second-tier companies like Lanier.

Lanier, however, has a solid market presence and recognition, Goldberg added. "So while it won't be an easy battle, it will be one in which Lanier will not be devastated."

Harris, too, has been trying to turn the earnings corner after six consecutive quarters of profit declines. Joseph Boyd, Harris chairman, told security analysts in April that the second half of 1983 would mark the beginning of a period of sustained growth, based on promises of new product offerings, including a word processing system.

Fisher Says Encore's Plans Will Preclude Nothing

(Continued from Page 49)

mentum. The companies will either be purchased outright or enter the folds of the Encore umbrella via stock exchanges, licensing or marketing agreements; private corporations are preferred.

Encore will offer a variety of products embracing a wide range of capability and price and will cut slow product cycles by "extensive and innovative" use of fast turnaround design, prototyping and manufacturing techniques, the company claimed.

Acting as autonomous divisions, the acquired firms will report to and develop strategies with a senior member of the Encore staff.

Encore is currently involved in serious talks with about 10 such firms, according to Fisher, who declined to identify those companies or their products. In fact, Fisher made it clear at the start of the conference that he would not get into specifics about the kinds of products Encore was interested in acquiring. He suggested instead that Encore would not "preclude" any product type or market, suggesting Encore could conceivably find itself pushing products in all sectors of the high-technology market.

Asked whether Encore had a specific timetable, Fisher replied, "No."

Encore's financial picture was also left somewhat vague. Currently, about 20 Encore staffers have backed the new venture with a total of $1 million. And Fisher does not foresee Encore going public within the near future.

Charles Casale, Encore's vice-president of corporate affairs, said, "We do have other funding sources available to us, but we are really still in the organizational stage."

Encore's Lineup

The senior executives of Encore Computer Corp. include:

- Kenneth G. Fisher — chairman, president, chief executive officer.
- Henry Burkhardt III — vice-president, corporate development; former co-founder and vice-president of finance and administration of Data General Corp.
- C. Gordon Bell — vice-president, technology; former vice-president, engineering, at Digital Equipment Corp.
- Charles Casale — vice-president, corporate affairs; former independent financial consultant affiliated with Morgan-Keegan and DQ Securities.

Formerly at Prime Computer, Inc., other Encore execs include Robert G. Claussen, vice-president, marketing, formerly vice-president, domestic sales; George H. Dudley, president, sales and service, formerly vice-president, Eastern operations; John D. Ludden, vice-president, controller, formerly vice-president, marketing services; and Eugene Ringstad, vice-president, formerly vice-president, Central operations.

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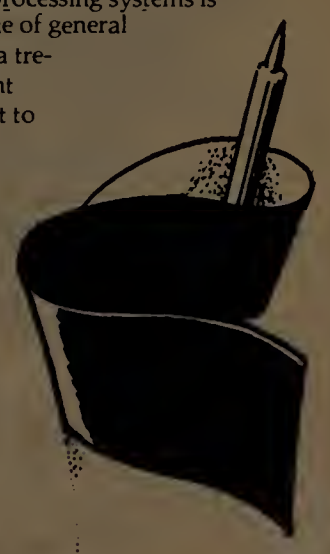

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As Economy Shifts Into Second Gear

Honeywell, CDC Post Second-Quarter Gains

MINNEAPOLIS — The economy's shifting into second gear was reflected in second-quarter results posted recently by Honeywell, Inc. and Control Data Corp.

Although Honeywell reported a 31% profit decline to $58.7 million from $85.6 million a year earlier, the 1982 profit figure included a $30 million capital gain earned when the company sold its shares of CII-Honeywell Bull of France. Otherwise, earnings would have been up slightly over 1982, a reversal of the trend of consecutive down quarters that has plagued the company.

Revenues for the quarter were up 5.5% to $1.4 billion compared with $1.3 billion last quarter.

Edson Spencer, company chairman and chief executive, said orders from the Information Systems Division over the first six months of 1983 were up slightly, an indication that company growth is not coming from that division just yet.

Strong performances by its information services and products businesses offset a downturn in computerized financial services to give CDC a 13% gain in second quarter profit.

Earnings totaled $38.8 million or $1.01 per share, up from $34 million or $.91 per share a year earlier. Revenues for the quarter rose nearly 8% to $1.14 billion, up from $1.06 billion.

CDC said shipments of computer systems and orders for peripherals were stronger than anticipated, leading the company to predict higher annual earnings. In 1982, CDC earned $155 million on sales of $4.3 billion.

Mainframe Software Firms Join Micro Counterparts

(Continued from Page 49)

er. The important advantage a mainframe software vendor can offer is its expertise in the event interaction between large and small systems is desired," Farrelly explained.

ADR, he claimed, has studied the micro-mainframe relationship for over 18 months and has learned that users interested in microcomputers for their shops are looking to the company for direction.

"The use of personal computers and personal computer software is new to DP managers. They appear to appreciate help in selection," Farrelly noted.

He added, "ADR will offer its usual start-up services for the micro software as it has done for mainframe software."

Agreeing with Farrelly's position on how the DPer will select microcomputer software was David Troy, senior vice-president of planning for CAI.

Troy said that the DPer is really still faced with the same type of decisions in selecting microcomputer software as he is with selecting systems software. He noted that the differences in hardware are "almost indistinct," and the only real consideration is finding solutions to DP problems.

"For example, it's not important whether you are dealing with a micro network or a mainframe network. The problem is getting the two to interact.

"A link without the knowledge of the processing function is no more than a data transfer function — there's duplication of data at both ends. What DPers are going to need is software capable of achieving these types of things — providing solutions. Does he want interactive terminals or total central DP control?" Troy commented.

Favorable Reaction

Users contacted also thought favorably of the marriage of system houses to microcomputer firms. Jack Klein, manager of DP for ABC Liquors of Orlando, Fla., said that although his shop is now only using a few IBM Personal Computers, there will "eventually be a lot of good" coming out of the mergers.

"Anytime there is a chance to pass meaningful data to pertinent parties, whether it be microcomputer to mainframe or whatever, positive results will be realized. The medium isn't important. If DPers can learn how to better merge software through these companies' joint efforts, the better it will be," Klein said.

Another user, Kevin O'Neill, operations manager for the Bank of New York, said he prefers a software company he is "used to" to introduce him to microcomputer software. He said sometimes it is difficult enough dealing with the systems software already in-house.

Vendors that know large systems together with microcomputer vendors are a "hard-to-beat combination," he concluded.

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AT&T Quarterly Profits Rise 11%, Revenues Up 8%

NEW YORK — AT&T posted an 11% gain in quarterly profit, reporting earnings of $1.94 billion or $2.03 per share compared with a profit of $1.75 billion or $2.04 per share in the second quarter last year. The per-share drop reflected an increase in common stock outstanding, which diluted the value of remaining shares.

Revenues in the period rose more than 8% to $17.4 billion from $16 billion a year earlier. AT&T said the figures included a $96.5 million extraordinary charge to account for a consolidation of its Western Electric distribution and repair operations. This was more than offset by the restoration of $217 million in its Pacific Telephone & Telegraph unit's back-tax liability.

As a result of that consolidation, about 830 jobs will be affected, with some eliminated, the company said.

Commenting on the quarterly results, Charles L. Broan, company chairman, said AT&T will face some difficult years as a result of the court-mandated divestiture of the company.

IBM Japan Signs Joint Agreement With Two Firms

TOKYO — IBM Japan, an IBM subsidiary, has agreed in principle with two Japanese companies to form a joint venture to develop and market products and services.

Mitsubishi Corp. and Cosmo 80 Corp. recently signed an agreement with IBM Japan to develop computer software and services for customers to help them develop applications using Nippon Telephone and Telegraph's futuristic Information Network System (INS).

The main thrust of INS, to be completed at the start of the 21st century, is an integrated telecommunications system that will provide telephone, video communications, facsimile and data communications through one integrated terminal and one network.

The joint venture company will also start a school to train information processing professionals, according to an IBM spokesman.

The $4.2 million training venture will be 34% owned by IBM and Cosmo each and 32% owned by Mitsubishi, it was reported by Kyodo, the Japanese news service. The marketing venture, to be capitalized at $800,000, will be owned 45% each by IBM and Mitsubishi and 10% by Cosmo, Kyodo reported.

Details regarding the formation of the joint venture are currently under discussion among the three companies, according to the IBM spokesman.

TI Realizes Loss Of $119 Million

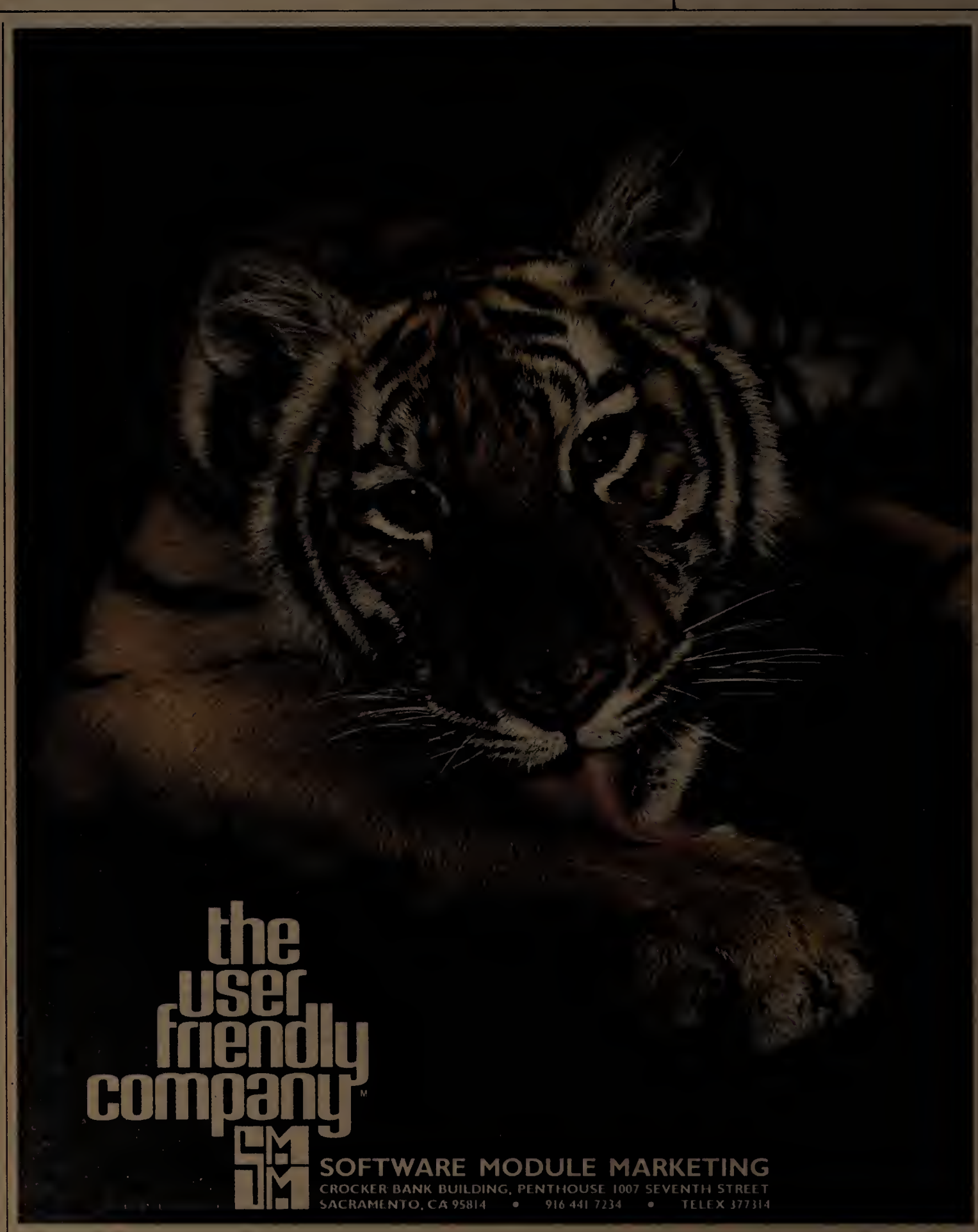
(Continued from Page 49)

"slightly ahead" of those a year ago, TI said. Order levels in this segment were flat compared to the first quarter, "reflecting continuing softness in the 16-bit minicomputer market," the company reported.

As a result of the financial turmoil at TI, William Turner resigned 10 days ago as president of the company's consumer electronics group. Turner has since taken a job with Automatic Data Processing, Inc. as president of its banking services group.

Turner had pioneered efforts to mass market the 99/4A in large retail outlets.

Turner was succeeded by Jerry R. Junkins.



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Memorex Corp.'s Rigid Media and Components Division will offer a 5¼-in. oxide media rigid disk cartridge under the Memorex Mini-Mark label. The cartridges are presently available to OEM customers in sample quantities.

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Xebec, Inc. of Sunnyvale, Calif., and **Priam Corp.** of San Jose, Calif., have reached a mutual agreement to promote the adoption of an interface standard covering the next generation of 5¼-in. Winchester drives.

A scholarship valued at up to $5,000 is being offered by **International Computer Programs, Inc.** (ICP) for students enrolled in a computer science or computer technology program in a four-year college or university. To qualify for the 1984-85 award, a full-time student must be a sophomore or junior who is maintaining a "B" average and is in need of financial assistance. Details can be obtained from Ellen A. Brown, Scholarship Coordinator, ICP, 9000 Keystone Crossing, Indianapolis, Ind. 46240.

* * *

Harry J. Gray, chairman and chief executive officer of **United Technologies Corp.**, has been elected chairman of a group of industry, academic and government leaders working to establish the National Science Center for Communications and Electronics.

* * *

General Electric Information Services Co. will offer its Mark III service teleprocessing network clients a specialized version of **Execuware's** Execuclub, a service that allows customers to sample and purchase software packages designed by Execuware for executives with little or no computer experience. Execuware is a division of **Aeronca, Inc.**

* * *

Online Computer Library Center (OCLC) and **Information Access Co.** (IAC) have announced a joint agreement to establish an overnight electronic document delivery system using IAC's full-text data base and the OCLC Interlibrary Loan subsystem and telecommunications structure.

Executive Corner

• **Michael J. Long** has been appointed president, chief executive officer and director of Advanced Electronics Design, Inc. Company founder and former President **Thomas S. Sacco** continues as chairman of the board.

• **John C.W. Taylor** has been elected president and chief operating officer of General Datacomm Industries, Inc.

• **Mark S. Levitan** has been appointed president and chief operating officer at Shared Medical Systems, Inc.

• **C.J. Stoll** has been named president and chief executive officer of Intelligent Systems, Inc.

• **Jacques G. Maisonrouge**, IBM senior vice-president, has been elected to the Board of Directors of IBM, and **Donato A. Evangelista**, deputy general counsel, has been elected an IBM vice-president.

• **James R. Oyler** has been promoted to vice-president, marketing, of Harris Corp.'s Information Systems Sector.

• **Michael Gallup** has been appointed vice-president, product marketing, for Datapoint Corp.

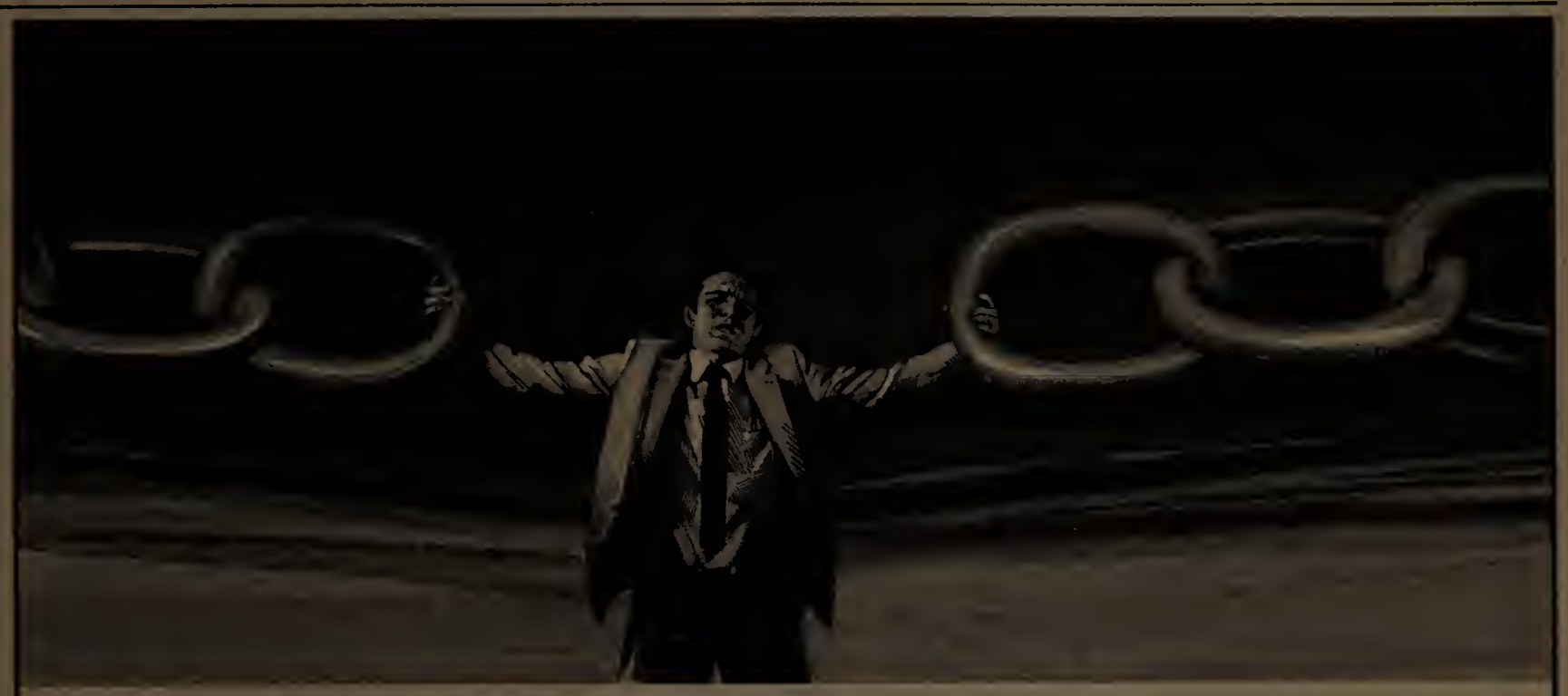
• **Marcelo A. Gumucio** has been named executive vice-president, marketing, for Cray Research, Inc.

• **John Bartell** has been promoted to senior vice-president of administration at Information Industries, Inc.

• **William Levin** has been appointed vice-president, program management, and **Jim Rowsey**, vice-president, finance, at Pertec Peripherals Corp.

• **Frank S. Madren** has joined Pyramid Technology as vice-president of marketing.

• **Gerard Lacourly** has joined Cisinetwork Corp. as a senior vice-president.



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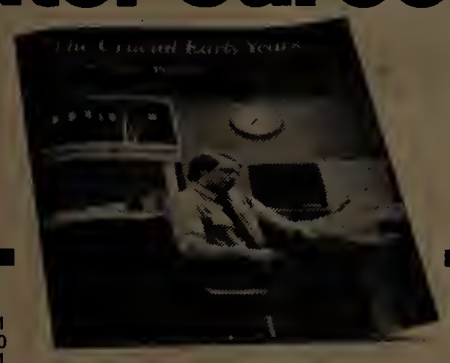

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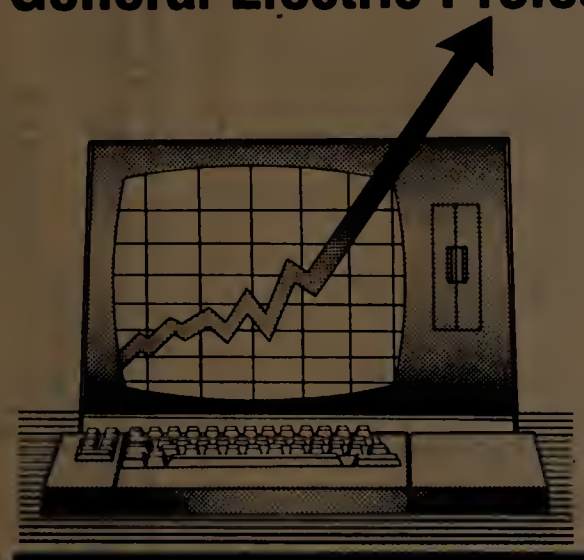

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Please send resume to:
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The Director is responsible for all administrative and some academic computing, developing long-range ADP plans, preparing operating budgets, recruiting staff, and insuring that the Universities receive timely and accurate management information.

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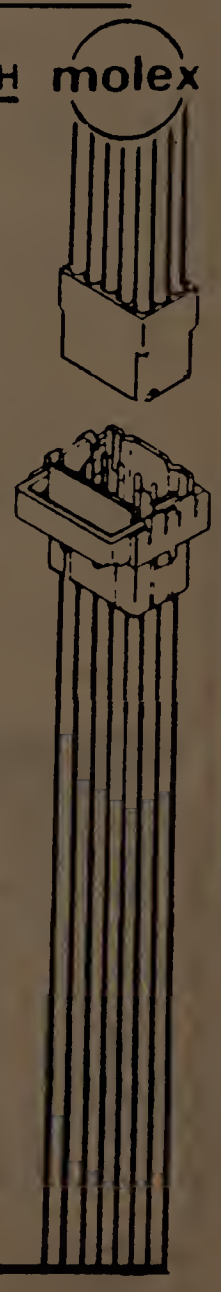

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Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Becky Adams or Elaine Knauss,
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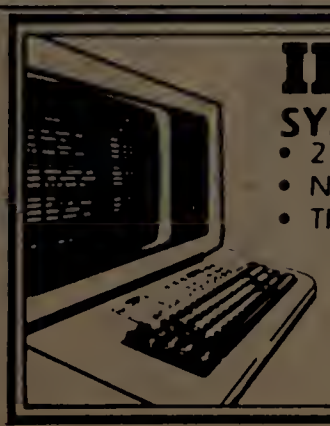

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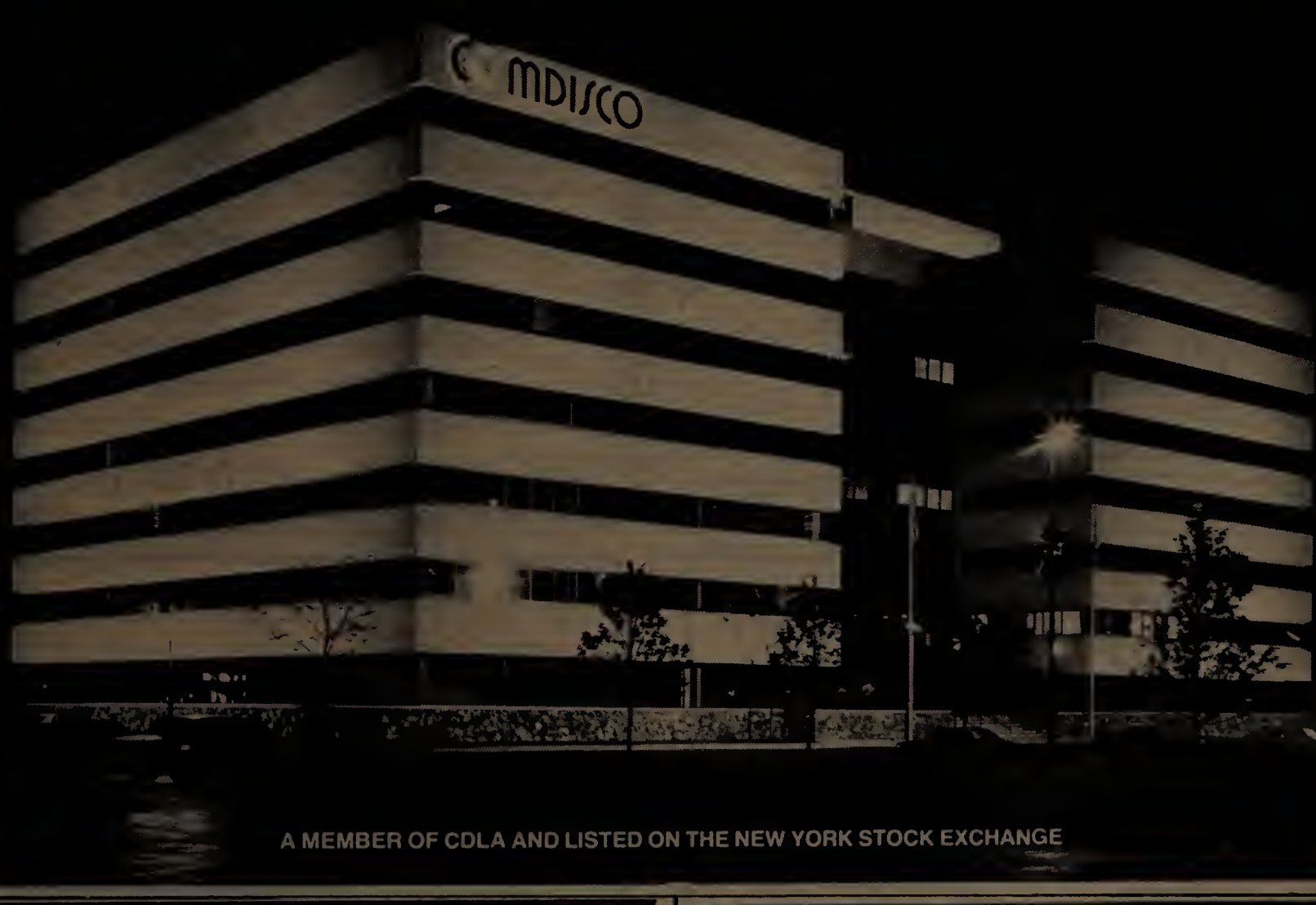

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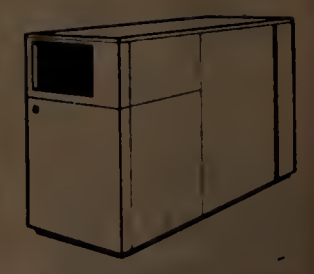

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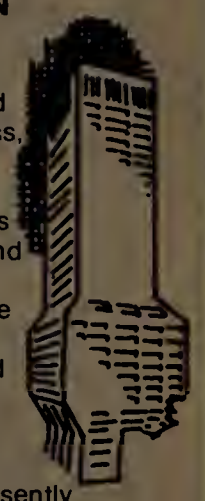

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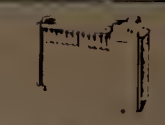

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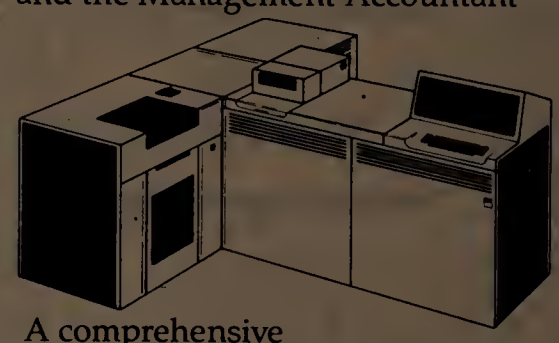

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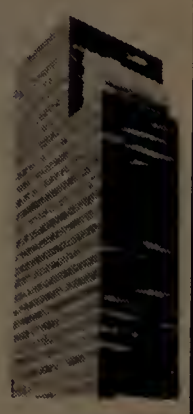

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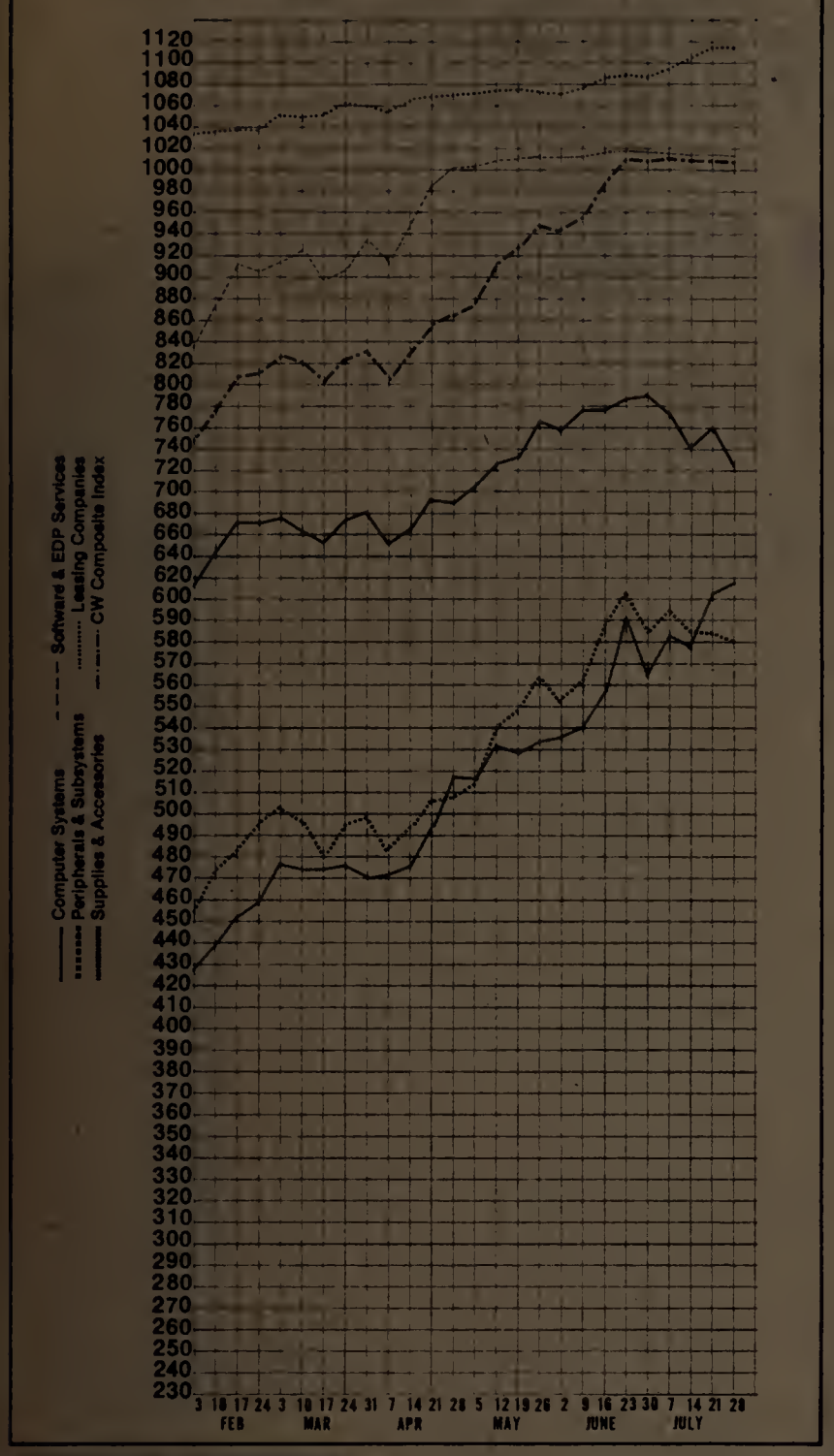

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All statistics compiled, computed and formatted by TRADE QUOTES, INC Cambridge, Mass 02139

EXCH		1982-83 RANGE (1)	CLOSE JUL 27 1983	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	8- 30	23 3/4	-1 1/2	-5.8
N	BURROUGHS CORP	28- 58	54	- 1/2	-0.9
O	COMPUTER AUTOMATION	7- 17	11 3/4	-2 3/4	-18.8
A	COMPUTER CONSOLES	8- 28	21 1/4	-4 3/8	-17.0
N	CONTROL DATA CORP	21- 62	58 5/8	-1 5/8	-2.7
N	CRAY RESEARCH INC	20- 52	47 1/4	+ 7/8	+1.8
N	DATA GENERAL CORP	20- 74	70	+2 1/8	+3.1
N	DATAPOINT CORP	11- 36	22 3/8	+1 3/4	+8.4
N	DIGITAL EQUIPMENT	82-132	104 5/8	-11 1/4	-9.7
A	EECO INC	8- 18	14 1/2	-1	-6.4
N	ELECTRONIC ASSOC.	5- 15	12 3/8	-1 7/8	-13.1
N	FLOATING POINT SYST	16- 44	37 3/4	-2 3/4	-8.7
N	FOXBORO	22- 47	37 3/8	-1	-2.8
O	FULCRUM COMP ORP	1- 3	1/4	0	0.0
O	GENERAL AUTOMATION	3- 18	12 1/8	-1 7/8	-13.3
N	HARRIS CORP	20- 51	43 3/4	-3 3/4	-7.8
N	HEWLETT-PACKARD CO	38- 88	86 3/8	-7	-7.4
N	HONEYWELL INC	80-125	118 1/2	-3	-2.4
N	IBM	57-128	123 3/8	-2	-1.5
O	IPL SYSTEMS INC	5- 14	12	- 1/4	-2.0
D	MAGNUSON COMP SYSTS	2- 5	1	0	0.0
N	MANAGEMENT ASSIST	7- 18	10 3/4	- 1/8	-1.1
O	MINI-COMPUTER SYST	1- 2	2 1/8	0	0.0
N	MODULAR COMPUTER SYS	8- 18	14 3/8	-1 5/8	-10.1
N	MOHAWK DATA SCI	10- 18	13 5/8	- 5/8	-4.3
N	NCR	38-128	124	+1 7/8	+1.5
N	PERKIN-ELMER	17- 35	31 3/4	-2	-5.8
N	PRIME COMPUTER INC	11- 30	18 1/4	+ 1/8	+0.7
N	SPERRY CORP	21- 44	42 1/2	-1	-2.2
O	TANDEM COMPUTERS INC	14- 34	28 1/8	- 1/4	-0.8
N	TEXAS INSTRUMENTS	71-178	115 5/8	-15 1/8	-11.5
A	WANG LABS "B"	13- 42	34	-4 1/2	-11.8
A	WANG LABS "C"	11- 42	34 1/4	-5	-12.7
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	22- 80	58	-3	-5.0
N	COMDISCO INC	7- 42	38 1/4	+2 7/8	+7.8
S	COMMERCE GROUP CORP	1- 1	1/4	0	0.0
O	COMPUTER INVSTRS GRP	1- 2	1	0	0.0
O	CONTINENTAL INFO SYS	3- 18	14 3/4	+ 1/2	+3.5
N	DPF INC	5- 14	13 1/4	- 3/4	-5.3
O	ITEL	1- 3	1 1/2	0	0.0
O	LEASPAC CORP	1- 2	1/8	0	0.0
N	U.S. LEASING	18- 47	41 1/4	+ 1/4	+0.8

EXCH		1982-83 RANGE (1)	CLOSE JUL 27 1983	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 8	5 1/2	- 1/2	-8.3
D	ADVANCED SYSTEMS INC	8- 22	19 3/4	0	0.0
O	AGS COMPUTERS INC	7- 32	31	+2 7/8	+10.2
D	AMERICAN SOFTWARE	21- 31	24	-2	-7.8
N	ANACOMP INC	9- 23	13 1/8	+1 1/2	+12.8
D	ANALYSTS INTL CORP	5- 20	17 1/2	-2 1/2	-12.5
A	APPLIED DATA RES.	8- 37	25 1/2	-3 3/8	-11.2
D	ASK COMPUTER SYSTEMS	12- 38	37 7/8	+3 3/8	+9.7
S	ASTRODYNE COMP INC	1- 7	4 3/8	- 3/8	-7.8
N	AUTOMATIC DATA PROC	21- 44	40	-4	-9.0
O	COA COMPUTER ASSOC	5- 15	14	+ 3/8	+2.7
D	COMPUTER ASSOC INT'L	8- 35	35 1/4	+4 1/4	+13.7
O	COMPUTER HORIZONS	8- 20	18 3/4	-1 1/4	-6.9
O	COMPUTER NETWORK	4- 10	8 1/4	- 1/2	-5.1
N	COMPUTER SCIENCES	11- 23	18 3/4	- 1/4	-1.3
O	COMPUTER TASK GROUP	8- 22	15 3/4	0	0.0
O	COMPUTER USAGE	2- 22	18	- 1/2	-2.7
O	COMPUTONE SYSTEMS	14- 38	14	-2 1/2	-15.1
O	COMSERV CORP	10- 20	11 1/4	-1	-8.1
O	COMSHARE	6- 13	12 3/8	+1	+8.7
N	CULLINET SOFTWARE	12- 50	43 1/2	- 3/8	-0.8
O	CYCARE SYSTEMS INC	8- 27	17 3/4	-2 3/4	-13.4
O	DATA DIMENSIONS INC	1- 2	3/4	0	0.0
O	DATATAB	0- 2	1 3/8	0	0.0
O	DYATRON CORP	2- 4	3 1/4	0	0.0
N	ELECTRONIC DATA SYST	10- 42	38 1/2	+1 1/4	+3.3
N	INFORMATICS INC	10- 34	27 3/4	+ 1/4	+0.8
O	INSYTE CORP	1- 3	1 1/2	-	-4.0
O	IPS COMPUTER MARKET.	1- 2	1 1/8	0	0.0
O	KEANE ASSOCIATES	4- 15	14	+1 1/2	+12.0
A	LOGICON	12- 44	40 3/8	-1 1/4	-3.0
O	MNGT SCI AMER INC	8- 33	29 1/2	+1 1/2	+5.3
O	MATHEMATICA INC	12- 28	28 1/4	0	0.0
O	MATHEMATICAL APP GRP	12- 22	18 1/2	+ 1/2	+3.1
O	NATIONAL DATA CORP	5- 28	21	-1 3/4	-7.8
O	PANSOPHIC SYSTEMS	8- 30	24 1/4	+ 5/8	+2.8
N	PLANNING RESEARCH	6- 21	17 1/4	- 3/4	-4.1
O	POLICY MGMT SYSTS CP	38- 88	59 1/4	+ 1/4	+0.4
O	PROGRAMMING & SYS	1- 8	5 3/4	+ 1/4	+4.5
O	REYNOLDS & REYNOLD	17- 48	47	+ 3/4	+1.8
O	SEI CORP	11- 34	28 1/2	- 3/4	-2.7
O	SHARED MEDICAL SYST	13- 43	41 1/4	+1 1/2	+3.7
O	SCIENTIFIC COMPUTERS	6- 14	13 1/4	0	0.0
O	SOFTWARE AG	5- 17	10 3/4	+ 1/4	+2.3
N	TYMSHARE INC	12- 30	17 1/8	-1 7/8	-9.8
A	URS CORP	5- 18	18 3/8	- 3/4	-4.3
N	WYLY CORP	7- 17	13	+ 1/4	+1.8
	PERIPHERALS & SUBSYSTEMS				
P	AM INTERNATIONAL	2- 7	6	+ 1/8	+2.1
A	ANDERSON JACOBSON	8- 28	19	-1 7/8	-8.8
O	AUTO-TROL TECHNOLOGY	8- 28	27 1/2	+1 1/2	+5.7
O	BANCTEC INC	7- 33	20 3/4	- 1/4	-1.1
A	BEEHIVE INT'L	4- 15	11 3/4	-1	-7.8
A	BOLT,BERANEK & NEW	8- 60	54 1/2	+ 1/2	+0.8
O	CAMBEX CORP	2- 4	2 5/8	+ 1/4	+10.5
N	CENTRONICS DATA COMP	8- 28	25 3/8	-1 3/8	-5.1
A	CETEC CORP	4- 12	10 3/8	+ 1/2	+5.0
O	COGNITRONICS	2- 20	12 3/8	- 5/8	-4.8
O	COMPUTER COMMUN.	1- 2	2	0	0.0

EXCH		1982-83 RANGE (1)	CLOSE JUL 27 1983	WEEK NET CHNGE	WEEK PCT CHNGE
D	COMPUTER DEVICES INC	4- 21	8 1/8	-1 5/8	-16.8
D	COMPUTER TRANSCEIVER	4- 12	8 1/4	- 1/2	-5.7
N	COMPUTERVISION CORP	19- 53	45	-4 1/2	-8.0
N	CONRAC CORP	17- 38	20 7/8	+ 1/4	+1.2
A	DATA ACCESS SYSTEMS	1- 4	1	0	0.0
A	DATAPRODUCTS CORP	18- 41	27 5/8	+ 1/4	+0.9
A	DATARAM CORP	5- 12	11 7/8	+1 1/4	+11.7
O	DATUM INC	2- 17	15 1/2	+1 1/8	+7.8
O	DAVID JAMISON CARLYL	2- 7	3 1/2	+ 3/8	+12.0
D	DECISION DATA COMPUT	3- 18	11 1/2	-1 3/8	-10.8
O	DELTA DATA SYSTEMS	1- 4	2 3/4	-	-2.2
N	ELECTRONIC M & M	5- 11	8 7/8	- 1/2	-5.3
O	EVANS & SUTHERLAND	18- 50	45 3/4	-1 1/4	-2.8
D	GANDALF TECHNOLOGIES	10- 22	9 7/8	-2 1/8	-17.7
N	GEN'L DATA COMM IND	8- 25	23 3/8	-1 1/8	-4.5
O	GENERAL TERMINAL CP	1- 2	1/2	0	0.0
O	GREAT SOUTHWEST IND	2- 8	2	0	0.0
N	HAZELTINE CORP	7- 31	24 1/4	- 1/8	-0.5
D	ICOT CORP	3- 10	8 3/4	- 1/2	-8.8
D	INFORMATION INTL INC	10- 22	18 1/4	+ 1/4	+1.3
O	INTEL CORP	11- 45	42 1/4	+3	+7.8
O	IPL SYSTEMS INC	5- 14	12	- 1/4	-2.0
A	LUNDY ELECTRONICS	7- 15	18	+1	+5.8
A	MSI DATA CORP	14- 36	15 1/2	-1 3/8	-8.5
O	NETWORK SYSTEMS CORP	8- 34	30 1/2	- 1/2	-1.8
D	OMEX	3- 8	8	+ 1/2	+8.0
N	PARADYNE CORP	18- 30	15 1/4	-2 3/4	-12.5
A	PENRIL CORP	7- 14	12 5/8	+ 1/2	+4.1
O	RAMTEK CORP	12- 28	17	+1 3/4	+11.4
N	RECOGNITION EQUIP	4- 17	14 1/4	- 3/4	-5.0
D	SCAN DATA	1- 3	2 3/4	0	0.0
N	STORAGE TECHNOLOGY	18- 33	15 1/8	+ 1/8	+0.8
O	SYKES DATATRONICS	8- 27	8 3/4	-1 1/4	-12.5
A	T BAR INC	7- 17	14	-1 1/2	-9.8
A	TAB PRODUCTS CO	8- 30	27	+1 1/8	+4.3
A	TEC INC	8- 12	8 5/8	+1 3/8	+18.5
N	TEKTRONIX INC	34- 87	75 1/4	-5 3/4	-7.0
N	TELEX	5- 32	29 1/4	-1 1/2	-4.8
D	TESDATA SYSTEMS CP	3- 17	15 3/4	+ 7/8	+5.8
N	TIMEPLEX INC	7- 29	24 5/8	-2	-7.5
D	VISUAL TECHNOLOGY	8- 26	21	+1	+5.0
O	WILTEK INC	1- 4	1 3/4	+ 1/8	+7.6
	SUPPLIES& ACCESSORIES				
N	AMERICAN BUS PRODS	11- 31	27	0	0.0
D	BALTIMORE BUS FORMS	1- 2	1 1/4	0	0.0
N	BARRY WRIGHT	13- 31	30 1/2	+1 3/4	+8.0
O	CYBERNATICS INC	1- 2	1 1/2	0	0.0
A	DUPLEX PRODUCTS INC	12- 28	22 7/8	+ 5/8	+2.8
N	ENNIS BUS. FORMS	6- 25	22 3/4	+1	+4.5
N	3M COMPANY	49- 80	81 7/8	-2 5/8	-3.1
N	MOORE CORP LTD	26- 51	45 3/4	-1	-2.1
N	NASHUA CORP	8- 25	27 5/8	+5 3/8	+24.1
D	STANDARD REGISTER	11- 34	32 3/4	+ 1/4	+0.7
N	WALLACE BUS FORMS	11- 30	28 1/4	-1	-3.8

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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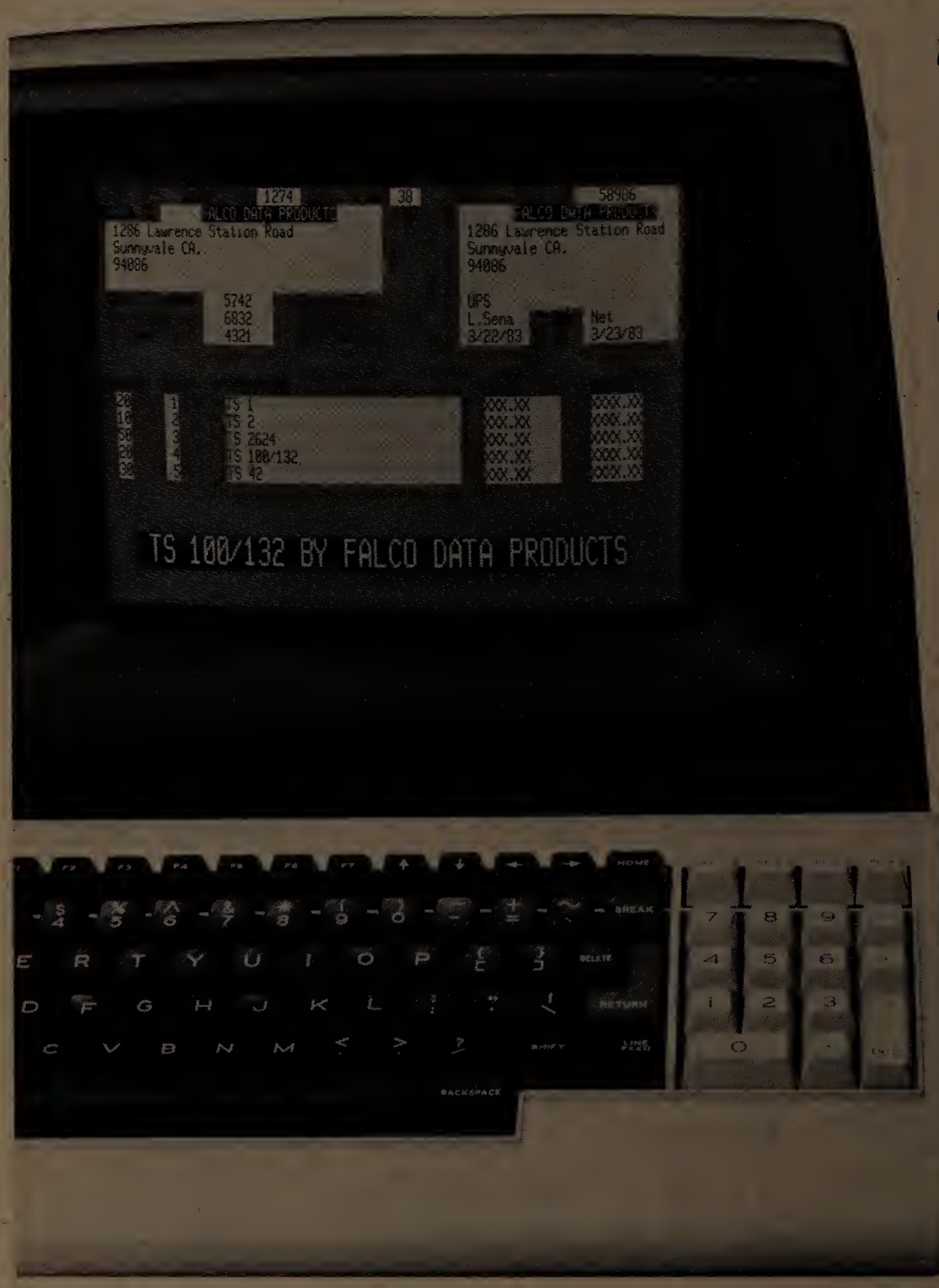

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